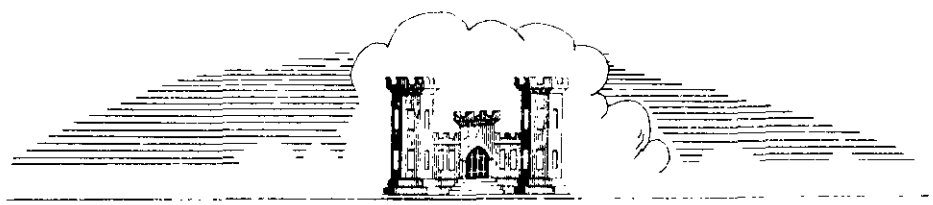
MAINTENANCE DREDGING PROJECT

BRANFORD HARBOR, CONN.

FINAL
ENVIRONMENTAL IMPACT STATEMENT



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

NOVEMBER 1975

STATEMENT OF FINDINGS ON THE PROPOSED
MAINTENANCE DREDGING PROJECT
AT BRANFORD HARBOR, CONNECTICUT

1. As Division Engineer of the New England Division, Corps of Engineers, I have reviewed and evaluated, in light of the overall public interest, pertinent information and data concerning the proposed maintenance dredging project at Branford Harbor, Connecticut. The work which will restore the Branford River to a depth of 8.0 feet involves hydraulic dredging of approximately 72,000 cubic yards of shoal material. Since these figures are based on a 1973 survey, a new survey has been scheduled. If additional shoaling has occurred, the depth to be dredged will be reduced. The dredged material will be placed in two previously used upland disposal areas. The time period for dredging and disposal is spring 1976. In conjunction with the Dredged Material Research Program of the Waterways Experiment Station in Vicksburg, Mississippi, which is conducting a nationwide study on disposal of dredged material including examination of alternate means of disposal, a salt marsh development was originally planned. Up to 20,000 cubic yards of dredged material would have been deposited within a retaining structure on tidal flats adjacent to the channel, and used as a substrate on which to establish high marsh grass. It would have been possible to dredge to the authorized depth of 8.5 feet if this form of disposal was used.

2. Alternatives to the proposed plan and their possible consequences have been considered. For the dredging project, alternatives were no action, alternate disposal sites, intertidal disposal, and alternate dredging methods. Alternate sites, sizes, and configurations were examined for the marsh development, as well as alternate retention structures. These alternatives have been found less satisfactory than the proposed plan.

3. The proposed dredging and the salt marsh development have both been examined

for their environmental, social, engineering, and economic consequences.

A. Adverse environmental impacts of maintenance dredging and upland disposal include possible increases in turbidity at the dredging site and disposal site outlets, and distrubance of the wetlands traversed by the discharge and effluent pipes. Both impacts have been minimized and are temporary. Impacts of the marsh development project would have included the loss of at least three acres of tidal flat. This loss would have been largely offset by the benefits associated with the new marsh. Other environmental impacts such as disturbance to wildlife during construction would have been negligible.

B. Adverse social impacts of the project which were considered include the temporary increases in noise, activity, and odor associated with dredging; the temporary disturbances associated with construction of a retention structure for marsh development and the loss of water view which would have been incurred by landowners in the vicinity, as a result of the marsh project. A more intangible impact was concern of the residents over potential project failure and subsequent damage to local natural and economic values. Attempts were made to mitigate these impacts.

C. Engineering factors of concern pertained to the marsh development project, and included construction on soils with weak foundation characteristics and disposal of dredged material to the required final elevation. Both concerns were examined and sufficient testing and analysis conducted to assure an adequate project design. Safeguards against project failure were incorporated into the design.

D. The no dredging alternative would have a severe economic impact on the project. This alternative was rejected, since failure to dredge would allow the harbor to close in time. Hardships would accrue to the commercial and recreational vessels plying the harbor, and the marine-oriented developments

present would be adversely affected.

4. Positive environmental, social, and engineering aspects exist in the proposed project and in marsh development on dredged material. In addition to benefiting the marine interests in Branford, the salt marsh development would have offered insights into the serious problem of disposal of dredged material with ramifications to all of New England. A negative aspect exists in potential failure of the marsh development project. At this time, that one negative factor is greater than all the positive factors, in that there is insufficient time remaining between the present and the operational completion date of summer 1976 to allow any but a marginal chance for success. I have determined that the overall public interest would be best served by terminating the salt marsh research portion of the dredging project, and by carrying the dredging project forward as per the proposed plan for upland disposal.

JOHN H. MASON
Colonel, Corps of Engineers
Division Engineer

DATE: 7 Nov 1975

PREFACE

Given that dredging is necessary to maintain our nation's navigable waterways and that disposal of dredged material must be done in an environmentally sound manner, the U. S. Army Corps of Engineers initiated a major research program in 1973 as authorized by the 1970 River and Harbor Act. The research, being conducted by the Waterways Experiment Station (WES) in Vicksburg, Mississippi, has as a major goal the determination of alternate means of disposal of dredged material. One alternative being examined is the use of sediments as a substrate for development of recreational areas, upland wildlife habitat, and marshes. Tested alternatives such as these to confined land disposal and open-water disposal are becoming more valuable every day.

Field testing is an important aspect of the WES research. Nine test sites with good geographical and ecological representation were selected in the United States. One of them, a salt marsh development site, was planned in conjunction with the authorized maintenance dredging of the Branford River in Branford, Connecticut. This New England site was selected for its unique technical, scientific, and practical aspects.

A preliminary project design was presented in the Draft Environmental Impact Statement (EIS) and amplified in the Proposed Final EIS. This design called for construction of a bulkhead to enclose an eight acre portion of tidal flats adjacent to a salt marsh, placement of dredged material inside at an intertidal elevation, and establishment of salt marsh cordgrass (Spartina alterniflora). The end result was to be a semicircular extension of the existing marsh.

A great deal of opposition to the project as described above was expressed, with most of the areas of concern being mentioned at the formal Public Hearing on 26 August 1975. As a result of the hearing, the project design was modified in an attempt to answer those concerns. The size was reduced to approximately three acres, the shape changed to ovate, and the study area moved 25 feet away from the existing marsh. These physical changes, which are reflected in the Final EIS as Appendix A, did not alter the original concept of the project.

The two configurations were similar in 1) concept, that of salt marsh development using dredged material as a substrate; 2) purpose, that of determining impacts and feasibility of such a development; 3) an overall goal of testing marsh development as an alternate means of dredged material disposal; 4) location in relation to the harbor and previous soil testing; and 5) type (but not magnitude) of most predictable impacts.

The project description in the Draft and Proposed Final EIS differs from that in Appendix A of the Final EIS by changes in size, in shape, and in construction details pertinent to these changes. Additional site-specific data which was collected in the spring and summer was available for inclusion in the Final EIS, specifically botanical and zoological descriptions. Many predictable and potential impacts of the project were to be lessened with modification of the project design, and are so presented.

Changes in the design necessitated a revision of the EIS and recalculation of engineering and construction specifications. During the entire history of planning for the project, time constraints and scheduling has been considered crucial. Scheduling was examined again after revision of the EIS and recalculation of specifications. At that point, the decision

was made to terminate the salt marsh development project. Insufficient time remained for the operational and administrative steps required to complete the project with any but a marginal chance of success.

SUMMARY SHEET

BRANFORD HARBOR MAINTENANCE DREDGING

( ) Draft (X) Final Environmental Statement

Responsible Office: U. S. Army Engineer Division, New England,
424 Trapelo Road, Waltham, MA 02154
(617 894-2400)

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The U. S. Army Corps of Engineers plans to perform maintenance dredging of the Federal navigation channel in Branford Harbor, Connecticut. The authorized channel is 8.5 feet deep, 100 feet wide and 2.3 miles long. Restoration of these project dimensions will entail the removal of an estimated 92,000 cubic yards of shoal material. However, the available land disposal areas have a capacity of only 80,000 cubic yards. Consequently, the project can only be dredged to a depth of eight feet which will require the removal of an estimated 72,000 cubic yards. Since these estimates are based on a 1973 survey, a new survey has been scheduled. If additional shoaling has occurred, it will mean further reduction of the depth to be dredged.

3. a. Environmental Impacts: To accomplish the maintenance dredging, a hydraulic dredge and a limited amount of construction equipment will be used. Operation of this equipment will be disruptive until the project is completed. The only major environmental impact associated with the maintenance dredging is improved navigation. Other environmental impacts are temporary and when considered on a long-term basis, are insignificant.

b. Adverse Environmental Effects: Associated with maintenance dredging will be an increase in turbidity in the water, disruption of benthic communities, disruption of fauna and flora associated with the land disposal areas and disturbance to the local human population. These disturbances are temporary and without lasting adverse environmental effects.

4. Alternatives to the Proposed Action: No action, alternate disposal sites, and alternate dredging methods have been considered for the dredging project.

5. Comments Received:

U. S. Department of Agriculture
U. S. Department of Commerce
U. S. Department of Health, Education and Welfare
U. S. Department of Housing and Urban Development
U. S. Environmental Protection Agency
U. S. Department of Interior
U. S. Coast Guard

Federal Power Commission
Connecticut Department of Health
Connecticut Department of Transportation
Connecticut Department of Environmental Protection
Harvey C. Anderson
Robert R. Kirkland
Frederick J. Collins

6. Draft Statement to CEQ: 9 April 1975.

Final Statement to CEQ: _____

ENVIRONMENTAL IMPACT STATEMENT
BRANFORD HARBOR, CONNECTICUT

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ENVIRONMENTAL IMPACT STATEMENT

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1.01 Location. Branford Harbor is located on the north shore of Long Island Sound, in the Town of Branford, Connecticut, about five miles east of New Haven Harbor. It consists of a narrow tidal stream approximately two miles long and an inner and outer harbor. The inner harbor is roughly circular in shape with a diameter of one half mile while the outer harbor is approximately a mile square. The two are separated by the projecting point of Indian Neck on the east (Figure 1).

1.02 Purpose of Maintenance Dredging. As a result of a hydrographic survey conducted in August 1973, the New England Division determined that dredging was required to restore the Branford Harbor project to its authorized depth of 8.5 feet below mean low water to accommodate present navigational requirements.

1.03 Nature of Project. The proposed project originally consisted of two separate actions. The first action is the maintenance dredging of an existing channel in the Branford River. The second action was the development of a new marsh utilizing material dredged from the Branford River. The Environmental Effects Laboratory of the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, is conducting an extensive nationwide study of disposal of dredged material. An integral part of this study concerns the manipulation of dredged material to develop marsh and/or wildlife habitat as an alternative to other disposal modes. A research effort was planned in Branford Harbor, Connecticut, to (1) demonstrate techniques for establishing a salt marsh community on dredged material and (2) to assess the impact of the development of a salt marsh on the environment. Information gained would have been directly useful to New England regional decision makers selecting alternatives for dredged material disposal and would have produced basic scientific information of value in understanding the ecological characteristics of Branford Harbor salt marshes in particular, and New England salt marshes in general. Due to time constraints, the marsh development project has been terminated. (See Appendix A for a discussion of the salt marsh development research).

1.04 Maintenance Dredging. The authorized project consists of a channel 2.3 miles long, 8.5 feet below mean low water, and 100 feet wide, from naturally deep water in the outer harbor to Indian Neck Road Bridge. The authorized project was completed in 1907 and has been dredged periodically since.

1.05 The removal of approximately 90,000 cubic yards of sediment is necessary to restore the channel to its authorized depth of 8.5 feet. Two upland disposal areas, designated as A (9 acres) and B (6.3 acres), located on the eastern shore of the Branford River (Figure 2), have a remaining capacity of 55,000 and 25,000 cubic yards of dredged material, respectively.

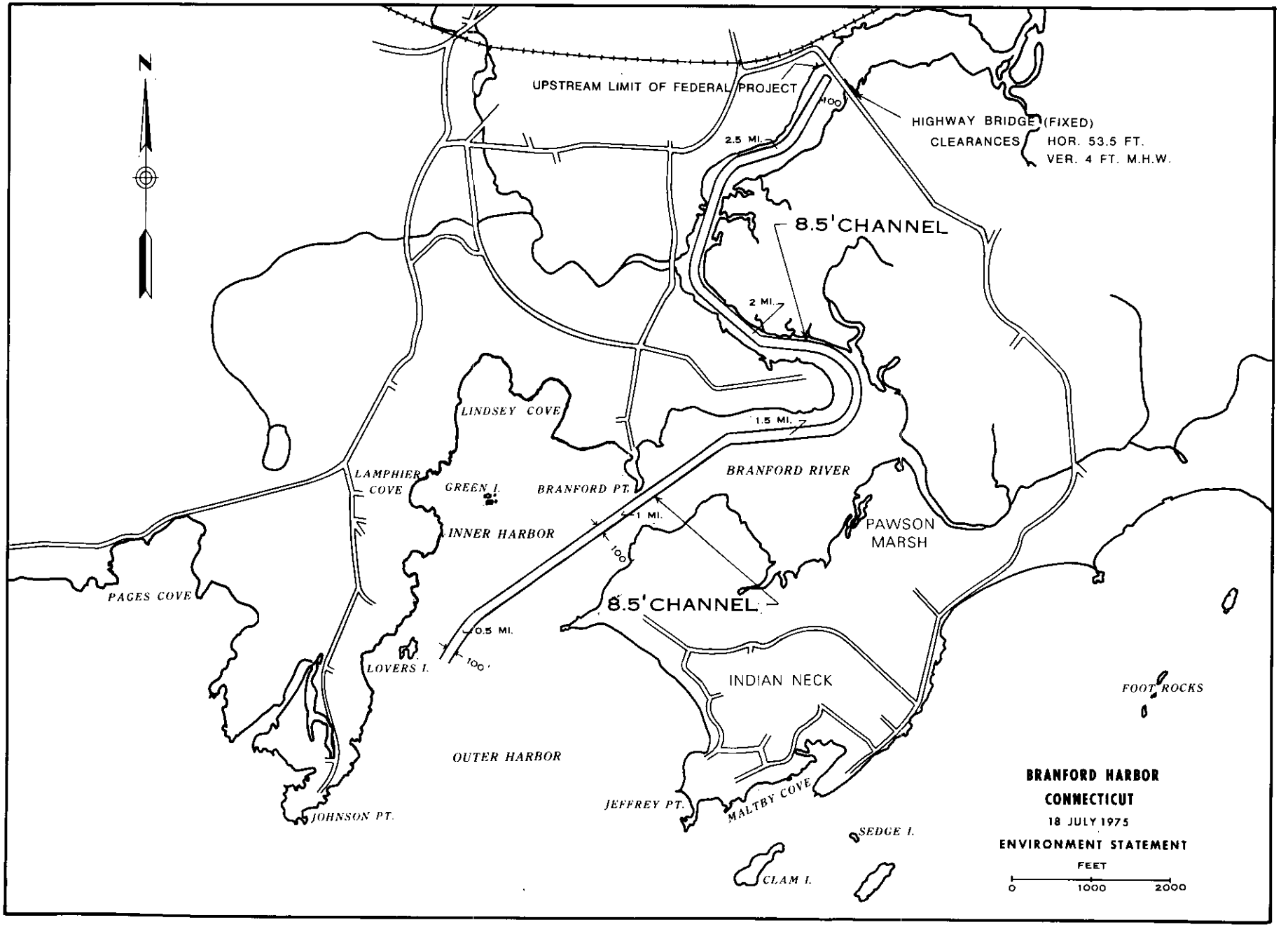
N
UPSTREAM LIMIT OF FEDERAL PROJECT
100
HIGHWAY BRIDGE (FIXED)
CLEARANCES HOR. 53.5 FT.
VER. 4 FT. M.H.W.
2.5 MI.
8.5'CHANNEL
2 MI.
LINDSEY COVE
1.5 MI.
LAMPHIER COVE
GREEN I.
BRANFORD PT.
BRANFORD RIVER
1 MI.
INNER HARBOR
PAWSON MARSH
100
PAGES COVE
8.5'CHANNEL
0.5 MI.
100
LOVERS I.
INDIAN NECK
FOOT ROCKS
OUTER HARBOR
JOHNSON PT.
JEFFREY PT.
MALTBY COVE
SEDGE I.
CLAM I.
BRANFORD HARBOR
CONNECTICUT
18 JULY 1975
ENVIRONMENT STATEMENT
FEET
0
1000
2000

FIGURE 1

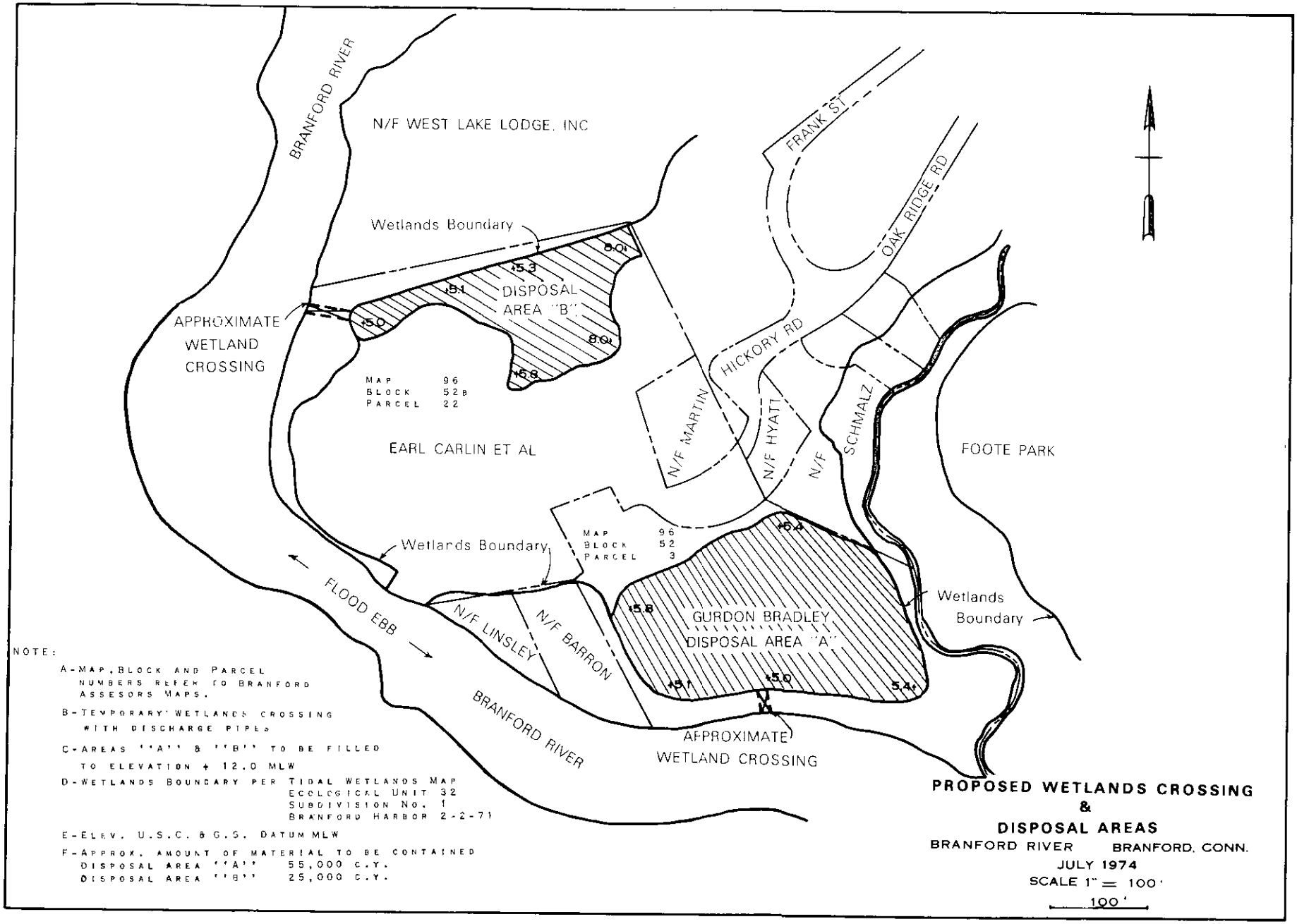
BRANFORD RIVER
N/F WEST LAKE LODGE, INC
Wetlands Boundary
+6.0
+5.3
+5.1
DISPOSAL AREA "B"
+5.0
+6.0
+6.8
APPROXIMATE WETLAND CROSSING
MAP 96
BLOCK 52B
PARCEL 22
EARL CARLIN ET AL
FRANK ST
OAK RIDGE RD
HICKORY RD
N/F MARTIN
N/F HYATT
N/F SCHMALZ
FOOTE PARK
Wetlands Boundary
MAP 96
BLOCK 52
PARCEL 3
+6.4
+5.8
GURDON BRADLEY DISPOSAL AREA "A"
+5.1
+5.0
5.4+
Wetlands Boundary
FLOOD EBB
N/F LINSLEY
N/F BARRON
BRANFORD RIVER
APPROXIMATE WETLAND CROSSING
NOTE:
A-MAP, BLOCK AND PARCEL NUMBERS REFER TO BRANFORD ASSESORS MAPS.
B-TEMPORARY WETLANDS CROSSING WITH DISCHARGE PIPES
C-AREAS "A" & "B" TO BE FILLED TO ELEVATION + 12.0 MLW
D-WETLANDS BOUNDARY PER TIDAL WETLANDS MAP ECOLOGICAL UNIT 32 SUBDIVISION No. 1 BRANFORD HARBOR 2-2-71
E-ELEV. U.S.C. & G.S. DATUM MLW
F-APPROX. AMOUNT OF MATERIAL TO BE CONTAINED
DISPOSAL AREA "A" 55,000 C.Y.
DISPOSAL AREA "B" 25,000 C.Y.
PROPOSED WETLANDS CROSSING
&
DISPOSAL AREAS
BRANFORD RIVER BRANFORD, CONN.
JULY 1974
SCALE 1" = 100'
100'

FIGURE 2

Both sites have been used previously as disposal areas. The two upland sites are acceptable to the Connecticut Department of Environmental Protection, the National Marine Fisheries Service, and the U. S. Fish and Wildlife Service. The limited capacity of the land disposal sites that are available will permit dredging to a depth of eight feet which will require the removal of an estimated 72,000 cubic yards. Since these estimates are based on a 1973 survey, a new survey has been scheduled. If additional shoaling has occurred, it will mean further reduction of the depth to be dredged.

1.06 The dredging will be accomplished by a hydraulic dredge with the sediments being pumped into the two upland disposal areas. To contain the dredged material, earth moving equipment will construct dikes of material found within the area. The top elevation of these dikes will be about +13.5 feet above mean low water. The dredged material will be piled to an elevation of about +12.0 feet above mean low water. Effluent will be released through pipes.

1.07 Benefits to be Provided by the Project - Navigation. At present, navigation in the channel is restricted since the channel is shoaled to such an extent that in places there are only four feet of water available at low tide. Dredging of the channel will enhance the extensive recreational and light commercial use of the harbor. During 1973, 77 tons of shell fish were handled in Branford involving 6,084 trips by the 15 commercial fishing vessels, having three-to-four-foot drafts, which operate out of the harbor. The home-based recreational fleet consists of 1,075 craft ranging from small outboards to sailboats and cruisers up to 60 feet in length. In 1973, 17,000 vessel trips were reported with drafts of up to 7 feet. Located within the harbor are nine marinas and associated boat yards, and two yacht clubs which provide mooring and service facilities for the home based fleet.

1.08 Authorization - Maintenance Dredging. The River and Harbor act of June 13, 1902 authorized the Corps of Engineers to dredge and maintain an 8.5-foot channel 100 feet wide in the upper part of the river between the lower and upper wharves. The River and Harbor Act of March 2, 1907 authorized the continuance of the channel, with the dimensions previously authorized, through the shoals to deep water in the outer harbor.

1.09 Compliance with Pertinent Public Laws. The Marine Protection, Research and Sanctuaries Act of 1972 (Public Law 92-532), authorizes the Secretary of the Army, after notice and opportunity for public hearings, to issue permits or, in connection with Federal projects, to issue regulations for the transportation and dumping of dredged material into ocean waters. Section 404 of the Federal Water Pollution Control Acts Amendments (Public Law 92-500) authorizes the Secretary of the Army,

acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for the discharge of dredged and fill material into the navigable waters at specified sites. The Fish and Wildlife Coordination Act, 16 U.S.C. 661 et Seq. requires that any Federal agency authorizing the control or modification of any body of water must coordinate with the United States Fish and Wildlife Service and with the appropriate State agency exercising administration over the wildlife resources of the affected State. Executive Order 11593, Protection and Enhancement of the Cultural Environment (13 May 1971), charges the Federal Government with a leadership role in preserving cultural resources. Compliance with these laws will be in accordance with existing regulations.

SECTION II - ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.01 General. Branford Harbor and the surrounding area are moderately developed. Approximately 70 percent of the harbor shoreline consists of tidal marshland with marinas; residential areas and industry account for the remaining 30 percent. The harbor provides mooring and services for 1,075 recreational boats based in Branford. Additionally, several commercial vessels and 500 transient vessels plying Long Island Sound use the harbor annually.

2.02 Geological Elements. The Branford quadrangle is located on the boundary between the Central Lowland and the Eastern Highland regions in southern Connecticut. The surficial geology is primarily the result of features developed by glaciations which crossed the area in a direction west of south. Till mantles a large portion of the area but is thin or absent over many ridges and hills. Stratified glacial drift deposited during the period following deglaciation was comprised of ice-contact deposits in the southeastern section, valley train deposits in the west, and stratified silt and clay deposits in a glacial lake in the Quinnipiac Valley area. During dissection of the glacial drift, streams deposited thin features of alluvium, and dissected valley trains have deposited wind-blown sand and silt in thin patches along the valley walls. Numerous swamps, locally thick along the shore, developed into tidal marshes.

2.03 Bedrock of the region consists of two very different rock groups, divided by a major fault known as the Triassic border fault, that trends southwest-northeast immediately west of the town of Branford. Northwest of the fault, the rocks consist of pink, brown, and red arkosic sandstone conglomerate, and siltstone and shale of Triassic age. Interbedded with these sedimentary rocks are flows and intrusive bodies of diabase and basalt. A southeasterly dip of 10° to 30° accompanied by local cross folding controls the trends of ridges and valleys in this area.

2.04 Southeast of the fault the rocks are comprised primarily of granite and gneiss of Pre-Triassic age. These rocks are generally massive with well-developed jointing frequently injected by conspicuous diabase dikes which parallel the fault structure.

2.05 Economic Geology. Outwash deposits of the Quinnipiac Valley provide a source of washed and graded aggregate primarily used as a source of concrete materials. Smaller pits opened in other ice-contact stratified drift deposits generally have a sporadic operation due to a wide range of grain size and unwanted silt layers.

2.06 Large quarries on the trap rock formations north of the Triassic border fault provide extensive trap rock products for use in concrete, road paving, ballast protection stone, and other uses.

2.07 Ground Water. Stratified drift deposits constitute potential sources of ground water for domestic use or for small industrial plants. Due to the high permeability of these formations, the water tables are generally low and closely adjusted to the nearest surface stream. Development of a reliable water supply from such aquifers is therefore highly dependent on thickness of sediment in the zone below the water table at the particular site. Till is generally too thin and in some places too impermeable to be a source of water other than for shallow wells of low yield. Most users of water in the Branford area derive their supplies either from surface reservoirs or from wells drilled in bedrock.

2.08 Soil Sediments. Coastal zones are dynamic environments with significant changes occurring coincidental with major storm events. Within the last 20,000 years New England has changed from a land dominated by a continental glacier to its present form. Since the retreat of the last glacier to the present time, the sea level has been rising. However, during the last 3,000 years, the rate of sea level rise has slowed to 0.3 ft/100 years (Hill and Shearin 1970).

2.09 Harbor Sediments. Sediment composition throughout the river is described as gray black organic silt except near the mouth where greater percentages of sand are encountered.

2.10 Sediment analysis for heavy metals and other parameters in Branford Harbor was undertaken by the U. S. Army Corps of Engineers in 1972 and 1974 (Table 1). Differences in mean values between the two dates probably reflect sampling location rather than any relation to time. The 1972 samples were dispersed throughout the river while the 1974 samples were taken in blocks essentially representing upstream and downstream. There is a general trend in which upstream concentrations of heavy metals are greater than those nearest the mouth. (Because of the small sample number (10), statistical analysis was not applied to this data; however, the trend is evident). This appears to be typical of many of the harbors throughout New England; the similarity of Branford Harbor to other Connecticut harbors is shown in Table 1.

2.11 Hydrological Description. The Branford River originates at the outlet of Lake Gaillard in the southwestern part of North Branford. From its source, the Branford River flows in a southerly direction through North Branford and Branford, a distance of about 9 miles, to its outlet into Branford Harbor. The river has a total watershed area of 27 square miles; however, the water resources of the upper 7.3 square miles above Lake Gaillard are highly developed for domestic water supply, resulting in a net effective drainage area for the river of about 20 square miles. Approximately one-third of the river (about 3 miles) is tidal; therefore, currents in this reach are more a function of tidal action than of watershed runoff.

TABLE 1

CONCENTRATIONS OF HEAVY METALS IN SEDIMENTS IN CONNECTICUT HARBORS
(% 10^{-3})

Harbor	Mercury* Hg	Lead Pb	Zinc Zn	Arsenic As	Cadmium Cd	Chromium Cr	Copper Cu	Nickel Ni	Vanadium V
Branford Harbor									
1972	3.34±1.20 1.70-5.90	10.44±4.49 3.92-19.64	67.58±35.80 19.93-150.77	2.74±1.33 .53-5.89	.25±.09 .14-.49	20.73±15.01 3.09-59.18	24.54±12.72 9.35-56.23	4.11±1.16 2.06-6.38	7.53±3.03 3.26-15.96
1974	7.15±1.88 3.60-10.00	8.69±2.94 3.60-12.80	33.78±17.80 4.30-69.10	.81±.50 .13-1.70	.24±.08 .14-.470	15.73±9.57 3.60-34.50	19.83±12.01 2.20-43.90	5.06±1.30 3.20-8.40	9.12±2.74 4.80-15.80
New Haven	3.40 .1-9.9	8.81 .47-62.2	25.24 1.4-100				17.14 .90-52.1		
West River	17.27 5.0-31.0	30.63 7.56-82.70	51.20 10.18-78.64		1.03 .5-1.34	24.43 6.31-34.18			
Milford	2.16±1.63 .50-4.60	11.87±8.06 1.38-21.21	24.85±16.20 3.58-40.17	1.37±.56 .42-2.14	.33±.20 .10-.56	10.99±7.09 .82-20.59	20.90±12.94 2.81-35.25	4.42±2.39 .92-7.03	3.99±2.44 1.02-7.17
Housatonic	1.27±1.28 .10-5.20	3.76±4.43 .57-15.18	21.60±26.95 .27-116.39				32.034±52.66 1.21-235.83		
New London	.98±.81 .20-3.30	2.60±2.00 .63-9.05	5.79±2.08 2.99-11.13				2.64±1.49 .94-9.23		
Norwalk	22.85 1.7-53.9	30.93±43.69 5.14-220.44	46.01±25.76 9.34-140.28		.45±.16 .18-.64	13.92±5.53 2.07-21.21	27.14±15.41 3.86-85.51		
Stamford	12.09±9.41 2.0-41.0	51.55±51.25 4.0-162.0	70.92±52.02 8.0-167.0						
Guilford	3.06±1.46 .3-4.7	5.64±2.55 .44-9.49	17.94±7.66 1.43-29.41		.17±.15 .03-.50	11.31±17.27 .10-75.84	10.83±4.98 .74-17.08		

* % $\times 10^{-5}$

NOTES: VALUES SHOWN ARE PERCENT OF SAMPLE'S DRY WEIGHT, AND ALL TESTS ARE PERFORMED IN ACCORDANCE WITH EPA "CHEMISTRY LABORATORY MANUAL," UNLESS OTHERWISE NOTED.

VALUES REPORTED INCLUDE MEAN, RANGE AND STANDARD DEVIATION FOR MOST HARBORS.

2.12 Climatology. The Branford River watershed characteristically has a variable climate. The basin lies in the path of the prevailing "westerlies" which generally travel across the country in an easterly or northeasterly direction producing frequent weather changes.

2.13 Temperature. The average annual temperature of the Branford River basin is about 50° Fahrenheit. Extremes in temperature range from occasional highs in excess of 100° F to lows recorded at less than -10° F. Freezing temperatures may be expected from the latter part of October until the middle of April.

2.14 Precipitation. The mean annual precipitation over the basin is about 46 inches. Short periods of heavy precipitation are frequent. Distribution of precipitation is approximately uniform throughout the year.

2.15 Snowfall. The average annual snowfall over the Branford River basin is about 36 inches, although less snowfall occurs near the coast.

2.16 Ice. Prior to 1972, ice was a regular occurrence on the river, but the last three seasons there has been none. Ice forms on the marsh and tidal flats before it closes the channel.

2.17 Storms. The rapidly moving cyclonic storms or lows that move into New England from the west or southwest produce frequent periods of unsettled, but not extremely severe weather. The region is also exposed to occasional coastal storms, some of tropical origin, that travel up the Atlantic coast and move over or within striking distance of the New England States. The most severe storms have been of tropical origin (hurricanes) which occur during late summer and early autumn. Four notable storms which affected the tidal portion of the Branford River occurred in September 1938, September 1944, November 1950 and August 1954.

2.18 Streamflow. A. U. S. Geological Survey streamflow gaging station was recently installed on the Branford River, however, there are no results available at this time. Based on stations of other rivers flowing into Long Island Sound, it is estimated that the river probably has an average flow of about 35 cubic feet per second (cfs), from an average of approximately 15 cfs during the summer and fall months to about 70 cfs during the spring months. It is expected that extremes in flow range from practically zero to highs between 1,000 and 2,000 cfs. Flow in the summer of 1975 was noted as extremely low by researchers from the Marine Sciences Institute at the University of Connecticut.

2.19 Tidal Information. In Long Island Sound the height of each tide varies during the lunar month, and the time interval for a complete tide cycle averages about 12 hours, 25 minutes. This results in the daily occurrence of two low and two high waters on an average of six out of seven days. Basic tide data at Branford Harbor is listed in Table 2 with a datum of mean low water (mlw).

TABLE 2

TIDE DATA, BRANFORD HARBOR, CONNECTICUT
(in feet)

Mean Tide Range	5.9
Average Spring Tide Range	6.8
Mean High Water (above mlw)	5.9
Mean Spring High Water(above mlw)	6.5
Mean Sea Level (above mlw)	2.7
Mean Low Water	0.0

2.20 Historical and Storm Tides. The maximum tidal elevations in Branford Harbor have occurred as a result of hurricanes. Based on historical accounts, the greatest tidal levels prior to 1900 occurred on 23 September 1815 and 24 August 1893 when tides reached an elevation of 9.5 mean sea level at Branford Harbor.

2.21 In the last 36 years Branford Harbor has been subjected to extreme tides from three major hurricanes and one severe storm, namely, the hurricanes of September 1938 and 1944, August 1954, and the storm of November 1950. Estimated tidal heights at Branford Harbor for these events are listed in Table 3.

TABLE 3

ABNORMAL TIDE DATA, BRANFORD HARBOR, CONNECTICUT

DATE	ELEVATION (ft, msl)
21 September 1938	9.5
31 August 1954	9.5
14 September 1944	8.8
7 November 1950	8.8

2.22 These elevations are estimated based on high watermarks in the Branford and Bridgeport Harbor areas, and represent maximum levels at Branford Harbor. Storm tide levels vary along the six miles of Branford shoreline.

2.23 Continuous records of tidal elevations are not available for Branford Harbor. Estimated frequencies of abnormally high tides have been determined based on high watermarks in the Branford and Bridgeport Harbor areas and are shown in Table 4.

TABLE 4

ESTIMATED FREQUENCY OF ABNORMALLY HIGH TIDES
BRANFORD HARBOR, CONNECTICUT

Frequency (years)	Elevation (ft, msl)
10	8.4*
50	10.5*
100	11.7*
Standard Project Hurricane	15.5*

*Figures are representative of the most severe combination of meteorological conditions that is considered reasonably characteristic of the region.

2.24 Flood Control Measures. The Corps of Engineers has no existing or proposed flood control projects in Branford Harbor or within the Branford River watershed.

2.25 Water Quality. Water quality in Branford Harbor is classified according to State of Connecticut water-quality standards as follows: Bs from Gaillard Dam to tidewater (Bs is suitable for recreation, agriculture, and cold water fisheries); SB from tidewater to the shellfish closure line (SB is coastal and marine waters suitable for recreation, good wildlife habitat, closed to shellfish harvesting). Beyond the shellfish closure line, Long Island Sound is classified as SA (suitable for all uses) (See page C-5).

2.26 The water-quality classification used above is based on the following characteristics: dissolved oxygen, sludge deposit, silt or sand deposits, color and turbidity, coliform bacteria, taste and odor, pH, temperature, and chemical constituents. Appendix C contains specifications for the classification system and a discussion of turbidity.

2.27 In general, the waters of Branford Harbor are high in dissolved oxygen (near saturation), quite turbid, and have a high enough count of coliform bacteria to close them to shellfishing. Large quantities of detritis are present.

2.28 Biological Resources. Connecticut is representative of New England. The important biomes (life zones) in the area include the Eastern Deciduous Forest and Northern Hardwood - Coniferous Forest (Aldrich 1963). The following discussion of the biological resources of Branford Harbor is presented in two broad categories, botanical and zoological.

2.29 Botanical Elements. The vegetation in the Branford Harbor area is typical of the general Appalachian Oak Forest Association found on the north shore of Long Island Sound. The oak-dominated system includes scarlet oak (Quercus coccinea), northern red oak (Quercus borealis), white oak (Quercus alba), and beech (Fagus grandifolia). The disturbed and cut over areas contain associations in various stages of succession.

2.30 Wetlands along the small bays and rivers off Long Island Sound consist of saline marshes at the bay-edge grading to less saline vegetation at higher elevations. Typical marsh plants include salt water cordgrass (Spartina alterniflora), salt meadow hay (S. patens), spikegrass (Distichlis spicata), and blackgrass (Juncus gerardi).

2.31 Vegetation of Upland Disposal Sites. The two upland sites selected for disposal are located on the east side of the Branford River and have previously received dredged material (Figure 2). The vegetative succession at both sites is typical of secondary succession adjacent to saline marshes in the region. Plants at both disposal sites were sampled on 24 November 1974; the species composition is presented in Appendix D.

2.32 Disposal Area A. The plant life inside the disposal area consists primarily of marsh species at the lower elevations with species indicative of drier sites on the dikes. The predominant species inside the disposal site include spikegrass, salt meadow hay, salt water cordgrass, and glasswort (Salicornia europea). Plants colonizing the higher elevations include spikegrass, marsh-elder (Iva frutescens), sea lavender (Limonium carolinianum), salt marsh aster (Aster tenuifolius), sand spurrey (Spergularia marina), and plantain (Plantago maritima). The dike on the east side of the site is colonized with a dense stand of reedgrass (Phragmites communis) which extends into the adjacent wetlands boundary.

2.33 Disposal Area B. This disposal site is an irregular area that has received dredged material during past dredging operations. The dominant plant life on the area is a stand of reedgrass which covers the entire center of the site. Plant life on the lower elevation consists of marsh species similar to those found on Disposal Site A. The remainder of the vegetation on the more elevated areas includes a highly diverse mixture of species including pokeweed (Phytolocca americana), greenbriar (Smilax glauca), Japanese honeysuckle (Lonicera japonica), and numerous young trees.

2.34 Plankton. The Connecticut Department of Environmental Protection Biological Monitoring Program has a sampling station (#28) in Branford Harbor. Data from this station includes identification and relative abundance of the plankton community in the harbor. Those data and information on other aquatic organisms can be found in Appendix E.

2.35 Riley (1973) conducted a study of zooplankton in Branford Harbor. Her results show peak abundance of the Calanoid copepod Acartia clausi occuring on June 21 with concentrations on the order of 10,000 to 100,000 individuals per cubic meter, and its subsequent decline and replacement by Acartia tonsa with concentrations on the order of 10,000 individuals per cubic meter, occurring in late July (end of sampling period). Temperature is considered the most important factor in this seasonal replacement. In addition, polychaete larvae with concentrations on the order of 1,000 to 10,000 individuals per cubic meter occurred throughout the sampling period with a gradual seasonal increase. Other zooplankton reported by Riley (1973) include trochophores, nematodes, gastropod larvae, lamellibranch larbae, foraminifera, tunicate larvae, echinoderm bipinnaria, tornaria larvae, medusae, fish eggs, and crab zoeae. 1975 samples are now under analysis by Marine Sciences Institute.

2.36 Invertebrates. On 13 December 1974, grab samples were taken in Branford Harbor using a modified Van Veen grab with an area of 1/23 square meter. Even though numbers are presented in Appendix F (page F-6), these data are considered qualitative. It is evident from the samples that the benthic infauna may be described essentially as an Ampelisca community. Pratt (1973) has identified the salient characteristics of these communities. These are listed in Appendix F (page F-8). Appendix F also contains listings of invertebrates expected to occur in Branford Harbor and those recorded in the New Haven Final Environmental Impact Statement.

2.37 Heavy Metals in Invertebrates. Researchers at the Marine Sciences Institute are investigating the heavy metal content of clams, oysters, and mussels in Branford Harbor. Preliminary data analysis shows that, compared to invertebrates from the Thames River and western end of Long Island Sound, Branford's invertebrates contain less or similar amounts of zinc, mercury, lead, cadmium, copper, and manganese. Nickel is higher in comparison. Mercury is in lower concentrations than EPA standards.

2.38 Zoological - Fishery. Over 100 species of finfish are found in the waters of Long Island Sound and its bays and estuaries. Appendix G (page G-1) lists 49 of the most common species. In addition, Appendix G (page G-3) contains a listing of finfish and macroinvertebrates found in nearby New Haven Harbor.

2.39 Sampling was conducted in summer of 1975 in Branford Harbor. Species caught in the river channel were summer flounder (Pseudopleuronectes americanus), Atlantic herring (Clupea harengus), red hake (Urophycis chuss), cunner (Tautogolabrus adspersus), and immature and adult bluefish (Pomatomus saltatrix).

2.40 Due to the high concentrations of plankton, bottom fauna, and forage fishes, Long Island Sound is used as a spawning and rearing area by many species of fish (Long Island Sound Regional Study 1974). The Atlantic mackerel (Scomber scombrus), and fish in the herring family are found in the area as juveniles and as adults. As an example, menhaden (Brevoortia tyrannis)enter Long Island Sound during May and remain through September. The adults spawn at the ends of the Sound and the larvae migrate to the safer, shallower estuarine waters. Thus, the menhaden, which is of commercial value for fertilizer and poultry feed (Thompson et al. 1971), uses the Sound as both a migration route and a nursery area. This is only one example of the general importance of Long Island Sound and its bordering wetlands to the life cycle of fish with commercial or sport fishery importance.

2.41 Sport Fishing. Sport fishing in the Long Island Sound region is a $13 million annual resource and is increasing. About 85 percent of the total is estimated to be salt-water fishing. The State of Connecticut alone had an estimated 340,000 salt-water fishermen in 1970. Branford Harbor is the home base of some of these fishermen, having 1,075 vessels operating out of its marinas and yacht clubs.

2.42 Primary salt-water sport fish include the striped bass (Morone saxatilis), bluefish, winter flounder, summer flounder, Atlantic mackerel, tautog (Tautoga onitis), and scup (Stenotomus chrysops). Lobster (Homarus americanus) clams, oysters (Crassostrea virginica), and blue crabs (Callinectes sapidus) are also taken.

2.43 Commercial Fishing. Commercial fishing, once a major industry in Long Island Sound, has declined over the years and now contributes to less than 10 percent of the consumption in the Sound area. Commercial activities in Branford are limited to off-loading shellfish at facilities in the harbor. In 1973 there were 10 fishing, 3 lobster, and 2 oyster boats operating out of Branford Harbor. The total catch for all commercial species amounted to 77 tons for the same period. Commercial species most sought after include shad (Alosa sapidissima), flounder, scup, menhaden, striped bass, bluefish, Atlantic mackerel, and tautog. Lobster, clams, oysters, crabs, and mussels are also commercially important.

2.44 Reptiles and Amphibians. Of the reptiles and amphibians recorded for the varied habitat of the Long Island Sound Region, three species are considered rare: the bog turtle (Clemmys muhlenbergi), the cricket frog (Acris gryllus), and the eastern spadefoot toad (Scaphiopus holbrooki) (Long Island Sound Regional Study 1974). Typical species expected to occur in the area of the two disposal sites are listed in Appendix H.

2.45 Upland Game Birds. Of the 2,000 licensed hunters in the Branford area, relatively few probably hunt upland game birds in the vicinity. Although ruffed grouse (Bonasa umbellus), and mourning doves (Zenaidura macroura) may be hunted, the major interest is likely reflected in the pheasant (Phasianus cochicus) and quail (Colinus virginianus) harvest reported for Connecticut in the Long Island Sound Regional Study (1974). A limitation in areas open to public hunting possibly restricts the number of individuals utilizing the game resource.

2.46 Atlantic Flyway. The Atlantic flyway is an area covering 446,000 square miles and contains about one-third of the human population of the United States (Addy 1964). Branford Harbor is located in the northern portion of the flyway and is situated in subregion 3 of the flyway which contains 6,000 acres of wetland habitat suitable to waterfowl (Long Island Sound Regional Study 1974). Since flyways are composed of many corridors (Bellrose 1968), the majority of the waterfowl enter the Atlantic Flyway south of Connecticut through New York and fly south to winter in Chesapeake Bay or the Carolinas (Addy 1964).

2.47 Migrating Waterfowl. The major migration route for Connecticut is an extreme eastern corridor that follows roughly the New England coast (Bellrose 1968, Kortright 1942). Important ducks harvested along the flyway include black ducks (Anas rubripes), wood ducks (Aix sponsa), mallards (Anas platyrhynchos), green-winged teal (A. carolinensis), and wigeon (Mareca americana) (Addy 1964). American brant (Branta bernicla), Canada geese (B. canadensis), white-winged scoter (Melanitta deglandi), black scoter (Oidema nigra), and black duck are the species most abundant as migrants along the coast (Sanderson and Bellrose 1969). The difference between the bird abundance and harvest is hunter-selection.

2.48 This area of Long Island Sound is an important wintering ground for the following avian fauna: horned grebe (Podiceps auritus), pied-billed grebe (Podilymbus podiceps), green-winged teal, American wigeon, greater scaup (Aythya marila), common goldeneye (Bucephala clangula), buffle head (B. albeola), hooded merganser (Lophodytes cucullatus), common merganser (Mergus merganser), and American coot (Fulica americana). Permanent residents include great blue herons (Ardea herodias), black-crowned night herons (Nycticorax nycticorax), mute swans (Cygnus olor), Canada geese, mallards, black ducks, killdeer (Charadrius vociferus), clapper rails (Rallus longirostris), great-black-backed gulls (Larus marinas), herring gulls (L. argentatus), and ring-billed gulls (L. delawarensis). A list of birds which have been seen in Branford Harbor is in Appendix I, courtesy of Noble S. Proctor of Branford. An annotated list of birds using the Long Island Sound area is also included.

2.49 Accidental and Uncommon Birds. The following discussion was taken from the Connecticut Newsletter (Proctor 1974). Unusual birds sighted in Branford Harbor and nearby areas in 1973 included; thick-billed murre, chuckwill's-widow, Wilson's petrel (Branford); ruffs, yellow-headed blackbird (Guilford); American avocet (Stratford); western grebe (East Haven); whistling

whistling swan (Clinton); mew gull, blackbilled magpie (Hammonasset State Park); lesser black-backed gull (New Haven); and white-winged dove (Milford Point). A local breeding population of black rails is suggested by the recent collection of an immature bird near Milford, Connecticut.

2.50 Rare and Endangered Birds. The southern bald eagle (Haliaeetus leucocephalus) and peregrine falcon are listed as endangered by the U. S. Fish and Wildlife Service and are therefore legally protected in Connecticut. An immature bald eagle was observed in Branford once in the fall by Noble S. Proctor (unpublished field notes), and a peregrine falcon was seen in August 1975. Five species of birds considered rare in Connecticut utilize habitat similar to that of Branford Harbor. They are the osprey (Pandion haliaetus), solitary sandpiper, short-billed marsh wren (Cistothorus platensis), least tern (Sterna albifrons), and piping plover (Charadrius melodus). Osprey have been reported in the Branford Harbor area during the spring, summer and fall, and a solitary sandpiper was seen this fall.

2.51 Mammals. Appendix J discusses the mammals that might be associated with the two disposal areas and their marsh edges. No rare or endangered mammals are expected to be found in the area.

2.52 Aesthetic Elements. Man's influence is quite visible in Branford Harbor and the results are mixed. Pleasure boats or fishing boats at anchor or plying the harbor are pleasurable sights to most; however, past disposal of dredged material has destroyed a portion of the salt marsh in the harbor. Several stands of reedgrass exist on old disposal sites; this plant would at best be classified as a weed by most people. Also, commercial, industrial and residential interests have encroached on the water's edge.

2.53 The beauty of the area is dependent upon the balance between its various elements, both natural and man-made. Some of these elements are subject to change by man and whether this improves or detracts from the aesthetic value of the area depends upon the individual. But most would agree that Branford Harbor is picturesque with its wooded uplands, patches of salt marsh and open-water vistas.

2.54 The positive aesthetic elements were recognized in a planning report for the Long Island Sound Regional Study (LISRS) (Roy Mann Associates 1975) in which the Branford shoreline was designated "scenic". Branford was subsequently placed by the LISRS in the Scenic Viewshed category of natural resources lands (New England River Basins Commission 1975).

2.55 Cultural Elements - Historical. Branford Harbor has enjoyed a rich history that typifies early New England. The Dutch sailed into the harbor and established a trading post, "Dutch House Wharf" on the west bank of the Branford River. Forty Englishmen soon followed and settled further inland on the banks of the Branford River. In 1638, this area, called Toteket, was purchased by the New Haven Colony from the Indians for "11 coats of trucking cloth and one coat of English cloth." In 1644, the area was settled and named after a Town in England, Brantford, later changed to Branford.

2.56 In a letter dated 13 February 1975 (NED file), Mr. John W. Shannahan, Director of the Connecticut Historical Commission, stated that the Branford project will not adversely affect any area which is potentially eligible for the National Register of Historic Places. This letter appears in Appendix K.

2.57 Cultural Elements - Archaeological. Negotiations are currently underway for an archaelogical survey of the two upland disposal sites.

2.58 Social and Economic Resources. Branford, Connecticut, can be generally characterized as an affluent bedroom community of New Haven. The residents have relatively high per capita incomes, high education levels, and hold jobs that typify the white collar sales and professional work groups. Residential property values, good schools, interest in local Government, and leisure activities reflect these characteristics. The following community profile is summarized from several reports published by the Branford Community Development Action Plan Agency.

2.59 Population Characteristics. The 1975 population of Branford is estimated to be 21,000. The 1960 census population was 16,610. In 1970, the population reached 20,444, an increase of 23 percent for that decade.

2.60 The 1970 census indicated that Branford's population is largely young adult with 45 percent between the ages of 20 and 54. The age group of 1 to 20 comprises the second largest group with 36 percent of the population. The remaining 20 percent of the population is over 54. Population projections for Branford are estimated to range from 23,700 to 27,000 by 1980 and 27,000 to 33,500 by 1990. Population density ranges from 800 to 1,000 people per square mile, but this density increases to over 2,000 people per square mile along the shoreline of Branford. The ethnic stock of Branford is primarily of European origin.

2.61 The average annual income of a Branford family is typically much higher than both the national average and a nearby metropolitan neighbor, New Haven. Data from 1966 indicate that the average annual income in Branford was $9,959, and rose to $11,900 in 1971.

2.62 While the majority of Branford's residents are well above the Federal poverty guidelines, 10 percent of the town households are not. Since 1965, the primary creators of new employment opportunities have been local government (25.6 percent), retail trade (22.1 percent), primary metals (15.7 percent), and service industries (10.5 percent). The closing of Branford's oldest industries in 1970 created a short-term loss of employment, but new industries have in general made up for this reversal. Unemployment in Branford, however, reached 7 percent in 1971 due primarily to the closing of the Malleable Iron Fitting Company.

2.63 Although the primary metal industry accounts for as many jobs as the retail trade sector, it is apparent that non-manufacturing jobs are increasing more rapidly than those in manufacturing. One of the most significant aspects of Branford's work force is that only 30 percent of the resident work force actually work in Branford; the remaining 70 percent commute to New Haven daily.

2.64 Although commercial fishery has declined in importance over the years, a sizeable fleet still operates out of Branford Harbor. Approximately 6,084 vessel trips by 10 fishing, 3 lobster, and 2 oyster boats were made during 1973 and a total catch of 77 tons was reported.

2.65 Education. There are seven elementary schools, one junior high or intermediate school, one senior high school, a parochial school, and two libraries in the area. Branford has expended approximately 55 percent of its town budget since 1950 to improve the school system.

2.66 The median education level for Branford citizens is 12.3 years. Over 15 percent of the heads of families have completed four years of college. Over 33 percent have four years of high school and 52 percent have less than a high school education.

2.67 Recreation. Very little land is in public ownership (approximately 600 acres) and only 76 percent of this is actually devoted to active recreational use. Consequently, much of the leisure or recreational activities take place on private lands and facilities. For example, only two miles of Branford's 12-mile shore is accessible to the public by way of beach clubs and neighborhood or town beaches. The Town of Branford owns less than a half mile of beach frontage. Expanded beach areas and neighborhood parks are the two most important physical needs for recreation. Growing interest in water-oriented recreation (boating), and in ecologically oriented (marsh life) educational activities may lessen the need for more actively oriented day-use recreational facilities. Long-range needs expressed by local citizen planning groups include a marina on the lower Branford River. Although Branford Harbor is a major boating center, a public sailing center in the lower reaches of Branford River has been proposed to make boating more accessible to Branford residents.

2.68 In 1973, 1,075 recreational craft, ranging from outboards and sailboats to large cruisers, operated out of Branford Harbor. To service these and the commercial vessels, there are nine marinas, nine boat yards, and two yacht clubs. Approximately 17,000 recreational vessel trips were made in 1973 out of Branford Harbor by these home-based craft. (New England Division Data).

2.69 Related Dredging Projects. Four interests in the harbor hold valid dredging permits: Indian Neck Yacht Club, Birbarie Marine Sales, Mr. Charles Bartlett, and Branford Yacht Club, Inc.

2.70 Branford Harbor Future Without the Project. Without dredging, shoaling will likely continue. This adverse condition will result in an increased frequency of groundings and will necessitate tidal delays for some boats. With an already crowded harbor, tidal delays will mean a greater percentage of boats navigating the channel at one time. Such a condition can increase the likelihood of vessel accidents, lead to costly repair bills and, in general, lessen the harbor's recreational value. In addition, the commercial potential of the harbor will decline.

SECTION III - RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

3.01 The Town of Branford and South Central Regional Planning Agency, New Haven, were consulted about the proposed dredging. Objectives of the proposed plan do not conflict with existing or proposed land use plans in the area.

SECTION IV - THE ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

IMPACTS OF MAINTENANCE DREDGING AND DISPOSAL

4.01 Maintenance and Disposal. Approximately 72,000 cubic yards of sediment will be dredged from Branford Harbor and placed on approved upland disposal sites (Figure 2). The impacts are considered minimal and are discussed below.

4.02 Dredging. The physical impacts of dredging silty sediments are generally recognized as turbidity, temporary oxygen depletion and temporary displacement of benthos in the channel. Dredging operations may have several ecological effects, the more obvious being the direct alteration or destruction (physical damage) of benthic and pelagic habitats and biota. Turbidity of the water interferes with shellfish feeding mechanisms and results in a decline in survival and growth rate. Waterborne sediments may also be deposited on the surface of shellfish growing areas impairing respiratory functions with possible mortality resulting from suffocation. Suspended sediments can also modify the quality and quantity of light penetration resulting in a subsequent reduction on the photosynthetic processes. Siltation can further clog and damage gills of many marine animals or reduce the buoyancy of their eggs. Dredging may release chemicals which are injurious to planktonic and nektonic organisms.

4.03 Two important facts must be considered regarding Branford Harbor. First, the water in Branford Harbor is turbid; at times the visibility is less than a meter. Second, the benthic infauna population is essentially an Ampelisca community. Such communities are noted for their rapid turnover rates. Sanders (1956) reported that Ampelisca produce two generations a year and no individual lives more than a year. It is likely that turbidity resulting from the dredging and land disposal runoff will for the most part be masked by the naturally high background turbidities in Branford, and the impact should be minimal.

4.04 Disposal. Approximately 72,000 cubic yards of material will be placed in the two upland disposal sites designated in Figure 2. These sites have been disposed upon in the past and will not be significantly affected by the deposition of additional material. The upland location of these sites will result in temporary odor releases, which will be objectionable to local residents. The dredge discharge and effluent pipes will cross about 100 feet of wetlands, but the impact will be slight and temporary.

4.05 Phytoplankton. The potential for disturbance of phytoplankton populations in Branford Harbor exists during the dredging phase, as potential increases in turbidity may reduce photosynthetic activities. Such impacts, if they occur, will be minimal and of short duration. Chemical changes in the water during the dredging operations may have short term impacts on phytoplankton. However, the background turbidity at times is such that the effects of dredging are considered minimal (see Appendix C).

4.06 Pestiferous Insects. Standing water can provide breeding habitat for disease-bearing insects such as mosquitos. The upland disposal sites will be left level and drainage will be provided to prevent water from ponding. This action will eliminate breeding habitat for pestiferous insects.

4.07 Wildlife. During the disposal phase, wildlife will be disturbed and some species will avoid the areas completely. These will be minor and short term impacts. It is expected that gulls and other opportunistic species will use the areas as feeding grounds during disposal operations.

4.08 Disturbance. During dredging and disposal, there will be some disturbance from noise and unaccustomed activities. A bulldozer will be used in the disposal area for construction of the retention dikes, and intermittently throughout the project.

4.09 Odor. A marine odor will be evident during pumping operations, and hydrogen sulfide will be a component of this odor. The odor will be most evident during the actual pumping operation and should not exceed ambient conditions once the area has drained.

4.10 Cultural Elements. The project will not adversely affect any historical resources. Arrangements have been made for an archaeological survey of the areas prior to and during disposal. If significant archaeological resources are noted, steps will be taken to recover them.

SECTION V - ADVERSE ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED

5.01 Maintenance Dredging and Disposal. The adverse environmental impacts of maintenance dredging and disposal are primarily limited to possible increases in turbidity at the dredging site and disposal site outlets. These are considered minimal. Odor at the upland disposal sites will be present for a short time. Impact on the 100 feet of wetlands being crossed by the discharge and effluent pipes will be slight and temporary.

SECTION VI - ALTERNATIVES TO THE PROPOSED ACTION

MAINTENANCE DREDGING

6.01 No Action.

6.02 Beneficial Aspects of No Action. The expected environmental impact of the maintenance dredging project is minimal, therefore, there are no significant beneficial environmental aspects to the no action alternative.

6.03 Adverse Aspects of No Action. Failure to maintain the Branford Harbor navigation project would mean gradual closing of the harbor. At present, many of the boats using the harbor are having difficulty negotiating the channel and continued shoaling would result in increased groundings and tidal delays. Without maintenance dredging, the development of marine facilities along the waterfront will have been pointless, and these will gradually deteriorate as the harbor becomes inaccessible to boats.

6.04 Rejection Reasoning of No Action. The adverse aspects of the no action alternative outweigh the beneficial aspects in terms of overall public interest. Without maintenance dredging, boating in Branford Harbor will gradually be curtailed.

6.05 Alternative Dredging Methods. Means of dredging considered were hydraulic and bucket and scow, with the hydraulic method being selected. Bucket and scow dredging was rejected since it generates excessive turbidity and is associated with open-water disposal. Hydraulic dredging was selected for its overall suitability to accomplish the work in the most efficient and economical manner.

6.06 Open-Water Disposal. This method of dredged material disposal was not considered as an alternative since, in recent years, the trend has been to regard open-water disposal as environmentally unsound. In addition, land disposal appeared feasible due to local cooperation and availability of sites.

6.07 Other Land Disposal Sites. Other than sites A and B (Figure 2), which have been previously used as disposal areas, there are no other feasible upland disposal sites available in the Branford Harbor area.

6.08 Beach Nourishment. Due to the undesirable nature of the sediments in the channel to be dredged, beach nourishment was not a viable alternative.

SECTION VII - THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 Natural Environment Trusteeship. In the past, project designers occasionally made a thorough study of the short-term beneficial and adverse effects of proposed projects only to find out many years after project completion and use that the project had caused many long-term impacts that were not expected or considered. Therefore, it is necessary to consider every possible short and long-term impact that will be caused by the project.

7.02 Human Environment Trusteeship. Implicit in the requirement that all environmental impacts and their effects be studied for a proposed project is the recognition that each generation is the trustee of the environment for succeeding generations. This environmental trusteeship includes relating the maintenance and enhancement of the natural environment to the long term benefits for these succeeding generations.

7.03 Among the facets central to long-term productivity of succeeding generations is a sense of socioeconomic well-being achieved by a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities. This is demonstrated today by many beautification programs in parks and scenic sites, improved working conditions in production plants, and constant striving for better living conditions and conveniences.

7.04 Toward consideration of this responsibility, implications of the proposed dredging which may affect the human environment of succeeding generations were studied and forecast based on present information, trends and goals. While dredging commits present resources in terms of land and money and the short-term usage of the natural environment will be altered, it is considered that these alterations are consistant with the national goals set forth in the National Environmental Policy Act (P.L. 91-190).

SECTION VIII
ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.01 The 2.3 miles of the Branford River maintenance dredging involves an irretrievable commitment of a natural resource in the destruction of sediment-associated biota thriving within the channel limits. This loss, however, is not considered irreversible since benthic communities sustain similar catastrophies in nature. Repopulation or colonization occurs as is demonstrated by the existing population of Ampelisca sampled in the channel.

8.02 The increased height of the two upland disposal areas may cause an alteration in the species composition of the future fauna and flora expected to colonize these areas. However, the anticipated impacts are not considered adverse.

SECTION IX - COORDINATION WITH OTHERS

9.01 Public Participation. Public participation is discussed in paragraphs 9.02 - 9.08.

9.02 Public Meeting. On 1 May 1974, a Public Meeting was held in the Branford, Connecticut Town Hall. At this meeting, plans of dredging the Harbor channel by NED were discussed. Also discussed was the possibility of incorporating an experimental marsh project into the dredging operation, in conjunction with WES.

9.03 WES Meetings. On 31 July 1974, an informal meeting was held with local townspeople and officials of Branford, Connecticut. Representatives of WES explained the Dredged Material Research Program and their interest in Branford Harbor as a research field location for an experimental marsh. Several people expressed opposition to the research effort. The primary concerns dealt with potential losses in real estate values as a result of alteration to the present marsh, loss of water view, and the experimental nature of the project.

9.04 On 1 August 1974, a meeting between local homeowners and WES personnel was held at the home of Mr. Robert R. Kirkland. Again opposition to the experimental nature of the project, and its potential impact on property values was expressed.

9.05 On 9 July 1975, an informal meeting was held with local landowners and public officials at the Branford Town Hall. Representatives of WES and NED explained those details of the marsh establishment project that had been developed since the last meetings in July and August of 1974. Approximately 35 persons were in attendance, and about half of these people spoke in opposition to the project. No one publicly spoke in favor of the research. The primary concerns were property values, loss of water view, potential odor, health, mosquito, and noise problems, dangers to local children, and the experimental nature of the project. Also expressed was concern that the Corps would proceed with the project regardless of local opposition.

9.06 Public Hearing. A Public Hearing regarding the project was held in Branford on 26 August 1975 with approximately 275 people in attendance. The dredging and research projects were presented by NED, and comments requested. Of 27 individuals who spoke, 16 were against the project, 9 in favor, and 2 simply raised questions. Apparently most people came to hear the discussion. Issues raised included aesthetics, safety, odor, project failure, public health, property values, impact on the existing marsh, impact on the tidal flats, Corps credibility, project size, and project design. The viewpoint of the residents of Branford is well understood by WES and NED as a result of the above meetings and other conversations, and the project design was modified after the hearing with the intent of alleviating as many of their concerns as possible.

9.07 Termination of the Marsh Development Project. This project modification required additional design work and rewriting of the Environmental Impact Statement which would have seriously jeopardized the project schedule. With such changes, completion of a successful project by summer 1976 could not be guaranteed. Therefore, the marsh development project was terminated as announced in a news release dated 22 October 1975.

9.08 Petitions. Three petitions regarding the Branford marsh site have been submitted to the Corps. Approximately 600 people signed the first two petitions in opposition, the first of which was included with a comment on the Draft EIS and appears as Appendix L of this EIS. The third petition of approximately 385 signatures, in favor of the project, was circulated after the hearing and is on file at NED. Four individuals signed who want their names removed from the first petition.

9.09 Coordination. The Draft Environmental Statement was sent to the following agencies or organizations in April 1975. Those agencies marked with an asterisk had responded by 15 July 1975. Comments received regarding the Draft EIS are included in Appendix M. General comments received from the public, but not specifically regarding the Draft EIS are included in Appendix N.

U. S. Department of Agriculture*
U. S. Department of Commerce*
U. S. Department of Health, Education and Welfare*
U. S. Department of Housing and Urban Development*
U. S. Environmental Protection Agency*
U. S. Department of the Interior*
U. S. Department of Transportation, Coast Guard*
Federal Power Commission*
National Marine Fisheries Service
Federal Aviation Administration
U. S. Fish and Wildife Service
U. S. Geological Survey
U. S. Public Health Service
Connecticut Department of Health*
Connecticut Department of Environmental Protection
Connecticut Department of Transportation *
Connecticut Department of Agriculture
Connecticut Department of Finance and Control
New England River Basin Commission
Town of Branford, Connecticut
Town of Fairfield, Connecticut
Connecticut Action NOW, Inc.
Connecticut Association of Soil and Water Conservation Districts
Connecticut Audubon Society
Connecticut Audubon Council
Connecticut Conservation Association
Connecticut Forest and Park Association
Defenders of Wildlife

Friends of the Earth
National Wildlife Federation
Nature Conservancy
Save the Wetlands Committee
Sierra Club
The Wildlife Society
Wetlands for Wildlife, Inc.

9.10 Comments of Government Agencies

9.11 U. S. Department of Agriculture (letter dated 16 June 1975)

Comment 1: The suitability of the soils for the proposed action has been considered. There doesn't seem to be another satisfactory disposal site within reasonable distance.

Response: Comment noted.

Comment 2: The EIS does not describe conservation measures to be applied. On page 1-3 there is no discussion of either temporary or permanent vegetation on constructed dike. Suitable seeding recommendations can be obtained from the New Haven County Soil and Water Conservation District.

Response: Comment noted. The dike was to have been a wooden structure; seeding would not have been required.

Comment 3: The proposed project will not effect any prime farm land or existing conservation systems. There are no proposed project actions by the Soil Conservation Service in the affected area.

Response: Comment noted.

9.12 U. S. Department of Commerce (letter dated 18 June 1975)

Comment 1: Sections of the draft environmental impact statement dealing with aspects other than marsh creation are thorough and comprehensive with regard to the aquatic resources for which the Department of Commerce, National Marine Fisheries Service is responsible. However, the paucity of site-specific data precludes an accurate review and evaluation of marsh development at Branford Harbor, particularly with regard to benthic fauna of the marsh site, project impacts on these organisms, alternative sites, potential for mud wave formation, protection of existing marsh areas, and potential for and mechanisms to cope with structural failures.

Response: The Final EIS has incorporated site-specific data made available since the Draft EIS in Appendix A. Detailed impact evaluation was one of the primary objectives for this study, and was to be obtained by comparison of data gathered by the University of Connecticut during pre-operational sampling (see page A-1) and that obtained during the operation and post-

operational phases. Alternative sites are discussed on pages A-12 and A-13 of the Final EIS. Mud wave formation is discussed on page A-10; protection of existing marsh areas on A-7, A-8, and A-10; and procedures for dealing with structural failures are discussed on pages A-10 and A-11.

Comment 2: The agencies charged with reviewing this statement have had little or no opportunity to provide expertise to the conceptual design of this project. We believe, therefore, that the Corps of Engineers' Waterways Experimental Station (WES) should establish and maintain close working coordination with concerned groups regarding this matter.

Response: Concur. Close working relationships are highly desirable in projects of this type, and efforts have been made to assure that other agencies are aware of the entire Dredged Material Research Program. Direct contact was made with the Department of Commerce to try to incorporate their expertise into this project.

Comment 3: Page 1-1, paragraph 1.02 - We suggest inserting the term "under utilized" for "unuseable" in the discussion of dredge material as a resource.

Response: Concur.

Comment 4: Page 1-1, paragraph 1.04 - The applicability of this salt marsh creation project to other locations is tenuous. Implying that techniques developed at Branford will be directly utilizable elsewhere may be an erroneous conclusion in view of the limitations of design and natural characteristics identified for the site.

Response: This salt marsh development project is typical of New England in terms of its geographic location and the fine textured nature of the dredged material. Conclusions drawn from this research would have had broad applications elsewhere in New England; however, site specific limitations were recognized.

Comment 5: A biological assessment of the mudflat should be made prior to marsh creation to determine what resources will be displaced because of the project. The draft environmental impact statement should describe methods to be used in assessing impacts of new marsh development on existing, adjacent marshes. Expected ecological characteristics of the new Pawson Marsh should be presented.

Response: A preliminary biological description of the tide flat at Branford appears on page A-4. The impact of the new marsh development on the existing marsh was expected to be negligible; however, a detailed biological inventory was underway in the project area to provide, when compared with post operational data, an assessment of impacts. The ecological characteristics of the new marsh should have been very similar to the existing Spartina alterniflora marsh.

Comment 6: Page 1-3, paragraph 1.08 - Point (C) states that an eight-acre marsh will be large enough to clearly note the effects of marsh creation on an estuary. The branch of WES charged with assessing the feasibility of marsh creation was established for a period of approximately five years beginning in 1973. This implies that all projects must be completed by the end of Fiscal Year 1978. Although no time frame for spoil material consolidation has been described, it appears that planting could not occur earlier than the spring of 1976. Allowing six months for report preparation, there remains only two growing periods for assessment studies. In view of the probable need for a period of spoil material compaction, we are concerned that there may not be sufficient time for an adequate study of the project.

Response: Detailed studies on consolidation of Branford dredged material conducted at the Massachusetts Institute of Technology indicate that the area would have sufficiently compacted to plant within two months of dredging.

Comment 7: Point (D): It should be noted whether or not existing tidal creeks in Pawson Marsh will be exposed to blockage, isolation, or filling by the deposition of spoil material from the marsh creation project.

Response: Tidal flow and drainage of the existing marsh would not in any way have been impeded as a result of this project, since the study site had been relocated to a position 25 feet from the marsh.

Comment 8: Page 1-4, paragraph 1.10 - Phase (3) is described as site preparation and propagation of selected marsh plants. We believe this to be the most important aspect of the proposal with regard to the success or failure of this project, yet little data of any significance is presented regarding these matters. The post-propagation data collection and monitoring period may not be possible due to the time constraints previously mentioned.

Response: Concur that the propagation phase was crucial to the success of the project. Please refer to pages A-2 and A-11 of the Final EIS.

Comment 9: Page 1-5, paragraph 1.12 - Since "current planning" envisions that the existing marsh will form the inside boundary of the containment area, and that the weir structure will be "... about a foot above the elevation of the edge of the existing marsh"... we recommend that a sandbag dike or similar revetment concept be implemented to insure protection of the existing marsh area.

Response: This recommendation was followed in the Proposed Final EIS, but was unecessary in the project design as modified and described in Appendix A.

Comment 10: Page 1-6, paragraph 1.13 - The Massachusetts Institute of Technology has performed extensive studies with regard to the feasibility and engineering aspects of this project. Information presented in the MIT study should be cited where applicable, and we suggest that a copy of that report should be appended to future environmental impact statements regarding this proposal.

Response: The engineering plan at this site was developed in consultation with MIT, and two preliminary reports prepared. These reports and numerous meetings led to the evolution of the plan. The preliminary reports are available (from WES) upon request; however, they would not add to the reader's understanding of this plan and were not inclosed in the EIS.

Comment 11: Page 1-6, paragraph 1.15 - In view of the discussion in paragraph 1.14 relative to the final evaluation of the marsh, it appears that only a few "local species" will be capable of survival on the created marsh. The draft environmental impact statement should present a complete list of those species other than smooth cordgrass, which may be utilized in marsh creation. Additionally, the statement should discuss the potential of insufficient compaction of spoils necessary to support planting efforts by the spring of 1976.

Response: The new marsh was to have been planted entirely to Spartina alterniflora. Detailed studies on consolidation of Branford dredged material conducted at the Massachusetts Institute of Technology indicate that the area would have sufficiently compacted to plant within two months of dredging.

Comment 12: Page 1-7, paragraph 1.18 - The draft environmental impact statement should not ignore the fact that knowledge gained from this project may not be applicable to many other areas. Further, environmental costs should be considered equally with feasibility and design characteristics.

Response: Each project is site specific; however, the knowledge gained from this project would have had general applicability to marsh development from dredged material in New England. The material is fine textured and moderately polluted, and the site is geographically representative of the region. Environmental costs (impacts) are discussed on pages A-6 - A-12 of the Final EIS.

Comment 13: A number of geodetic control survey monuments are located in the general vicinity of Branford Harbor. Also a number of tidal bench marks are located in the proposed project area, as described in the attachment. If there is any planned activity which will disturb or destroy these monuments, the Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, of which the National Geodetic Survey is a part, requires not less than 90 days notification in advance of such activity in order to plan their relocation. This Department also recommends that funding for this project include the cost of any relocation required for these monuments. We request that this advance notification be given to: Director National Geodetic Survey, Room 304A - WSC #1, 6010 Executive Blvd., Rockville, Maryland 20952

Response: Concur

Comment 14: Page 4-4, paragraph 4.09 - Although "... marsh configuration and retaining structures have been planned and designed to allow normal tidal exchange through the tidal creeks which traverse the marsh and prevent changes in salinity, nutrient exchanges, and detrital export in the marsh system", the statement should document how this is to be accomplished.

Response: Please refer to page A-7 of the Final EIS for a discussion of this issue as it pertains to the modified design.

Comment 15: Page 4-4, paragraph 4.12 - The discussion regarding potential failure of the project should address situations such as dike failure, over-pumping of revetments, inundation of the existing marsh, failure of the material to compact, mud wave creation, failure of the vegetation to stabilize the area, and loss of marsh stability if the artificial structure deteriorates at some later date.

Response: These issues are discussed on pages A-2, A-10, and A-11 of the Final EIS.

Comment 16: Page 4-10, paragraph 4.31 - The term "stabilized" should be defined particularly with regard to the marsh at the end of the first or second growing season. It should be noted whether slumping or lateral migration will interfere with attainment of stability.

Response: The new marsh would have been stabilized sufficiently at the end of the first growing season to withstand normal winter conditions and stability would have improved by the end of the second season. Please refer to pages A-10 and A-11 of the Final EIS for a discussion of lateral migration and slumping.

Comment 17: Page 6-8, paragraphs 6.30 and 6.31 - Justification for selection of Pawson Marsh as the site for a marsh creation effort should be presented. This justification should be supported with information on alternative sites outside of Branford Harbor's extensive estuarine marshes rather than relating to only local sites. Criteria used in eliminating sites because of "excessive pumping distance" should be presented. Additionally, we are interested in how the physical configuration, availability of colonizing plants, and the creation effort's applicability to other areas in New England were identified.

Response: Please refer to pages A-12 and A-13 of the Final EIS for a discussion of selection of Branford.

9.13 U. S. Department of Health, Education and Welfare, Food and Drug Administration (letter dated June 20, 1975)

Comment 1: Our National Shellfish Register indicates that both inner and outer Branford Harbor are classified as prohibited for the taking of shellfish. The closure line is about 2,100 feet south of the beginning of the dredging in the outer harbor. The proposed spoil areas are located up in the Branford River, a considerable distance from approved shellfishing waters. Due to the distance of the dredging operations and spoil areas from approved waters, it seems unlikely that the water would be affected.

Response: Comment noted.

Comment 2: In Appendix 1 on page 4, the National Shellfish Sanitation Program Manual of Operations is referred to as a two-part manual. There are actually three parts, Part I, Part II, and Part III.

Response: Comment noted. The appropriate correction has been made.

Comment 3: Also in Appendix 1 on page 1, the first three lines refer to a map showing water quality classification. We did not find that map in our copy.

Response: Comment noted, the map has been included (page C-5).

9.14 Department of Housing and Urban Development (letter dated April 22, 1975)

Comment 1: The proposed maintenance dredging activities will not directly involve any development activities within the purview of grant programs funded by the Department of Housing and Urban Development. Therefore, I have no comments to offer on the draft.

Response: Comment noted.

9.15 U. S. Environmental Protection Agency (letter dated July 1, 1975)

Comment 1: The Maine Department of Transportation has published a study entitled, Saltmarsh Relocation in Maine, 1974. This study discusses the material suitable for supporting marsh growth: the plant species, their nutrient requirements, productivity, and intraspecies variation. According to this study, it would seem that the bottom spoils from Branford Harbor may need fertilization in order to support marsh life. The final EIS should discuss the suitability of the dredge material to support marsh life as well as the amount of time that will be needed to have the marsh stabilize. A discussion of what safe guards will be needed in the interim prior to growth to control erosion at the tidal interface should be included.

Response: Please refer to pages A-2 and A-11 of the Final EIS. The ability of the dredged materials to support Spartina alterniflora has been demonstrated on Branford Harbor dredged material under greenhouse conditions at WES and at another site in Branford Harbor where these materials were deposited in an intertidal situation.

Comment 2: On page 1-3 one of the justification on which you based the decision to build an experimental eight acre marsh was that it could be located adjacent to Pawson Marsh without blocking any of the major tidal creeks. Because of the close proximity of several creeks we feel that the final statement should further address the potential erosion deposition problems and provide background information to support your conclusion on page 1-3.

Response: See page A-13, which addresses this concern in respect to the modified project design.

Comment 3: Branford Harbor has in the past supported beds of eastern oysters and hard shelled clams. It is also our understanding that these areas have been closed to shell fishing due to the Water Quality and potential contamination of the shell fish crop. However, before this project destroys this valuable shell fish resource we feel that you should consider transplanting the shell fish in an effort to regenerate other poorly productive areas. This would be consistant with the continuing effort to strengthen the shell fishing areas along the Connecticut Coast which state and federal programs are fostering.

Response: The possibility of transplanting the shell fish resource was under consideration. A final decision regarding this action was to be made when a detailed inventory of the existing resource was available. These data would have been available before the onset of construction.

Comment 4: In order to make the final EIS a more complete assessment, we feel that more specific information on the salt marsh should be included. We have, therefore, in accordance with our national rating system, rated this project LO-2. An explanation of which is enclosed.

Response: Comment noted.

9.16 U. S. Department of the Interior (letter dated, 16 June 1975)

Comment 1: In general, we believe that in most respects the statement adequately addresses the impacts of the proposed maintenance dredging and disposal phase of the project as they pertain to the areas of expertise and jurisdiction of this Department. However, as our specific comments will detail, there are certain aspects concerning the marsh development phase that we believe could be more adequately discussed.

Response: Comment noted.

Comment 2: Section 1.04, Page 1-1: This section discusses the applicability of this particular project to the New England region as a whole. We submit that while the project does have merit in the context of applied ecological reasearch, to say it will be applicable to the entire region is an overstatement. No two sites have exactly the same physical and biological characteristics and a method of marsh building that is successful or unsuccessful in Branford, Connecticut, does not determine the success of a similar experiment in Maine, for instance, or elsewhere.

Response: The proposed project did deal with many of the features that would be encountered at other potential marsh sites in New England. These are: fine-textured, moderately polluted dredged materials; soft foundation characteristics; geographic similarities; and similar species compositions. In this context the site would be generally applicable to other marsh development sites throughout New England.

Comment 3: Section 1.08, Page 1-3: The last sentence of this section states that the eight-acre marsh can be located without blocking any major tidal creeks within Pawson Marsh. However, Figure 3 indicated that while not directly blocking the tidal creeks as shown, the enlarged lower portion of the new marsh could alter tidal currents at the mouth of the creeks. We believe that this possibility could be eliminated by reversing the enlarged and narrow portions of the new marsh.

Response: The modified projeot design is shown on page A- and discussed on pages A-1 through A-3.

Comment 4: Section 1.15, Page 1-6 - This section should address the problem that could be encountered with stabilization of the dredged slurry and subsequent hindering of planting. If the dredged material does not consolidate sufficiently to support the weight of a mechanical planter or human being, planting of salt marsh vegetation could be delayed beyond the spring of 1976.

Response: Consolidation studies conducted by MIT and experience with similar materials at other sites indicate that vegetation establishment at the site would not have been delayed beyond the spring of 1976.

Comment 5: Section 1.22, Page 1-9 - The first sentence is at variance with some previous statements made by the Corps of Engineers' personnel concerning the economics of land-based disposal versus sea disposal. Sea dumping has been described to be the most economical method of spoil disposal, with land-based disposal being much more costly. We refer to a letter dated July 8, 1973, from Colonel Mason to Senator Ribicoff regarding Housatonic River in which he states, "In retrospect, the low bidder's per-cubic-yard cost of $6.47 for land disposal illustrates the added cost of alternatives to ocean disposal. Under current market conditions, ocean-disposal work is being bid at approximately one-half to two-thirds of that cost." No costs are mentioned in this statement at the prevailing linear foot rates for bulkheading,

and we question whether this project could have wide applicability to other routine maintenance dredging projects. In any event, estimated costs of this project should be given and comparisons made to other projects of similar volume.

Response: In any project, costs are related to the prevailing conditions. Each set of conditions will dictate a particular method of construction. Concerning the Housatonic letter, several shoals were over 10,000 feet away from the land disposal sites. This necessitated the use of booster pumps to cover the long pumping distance. Whenever land areas are not readily accessible, the cost of hydraulic dredging will increase rapidly. One of the results of this project would have been a cost analysis; this information is not currently available. Since this was a research project, costs were expected to be higher than normal.

Comment 6: Section 2.08, Page 2-3 - An additional item that would aid in evaluating impacts on ground water would be a statement in Section 2.08 and in Section 2.10 as to whether any encroachment of saltwater or other reversal of hydraulic gradient has been noted, or a simple statement of the principal direction of ground-water gradient for each of the major aquifers.

Disposal of dredging spoils on a tidal flat to develop a marsh land environment should not significantly affect ground-water resources; however, this conclusion would be strengthened by evidence of seaward hydraulic gradients.

Response: The proposed marsh would have had no influence on the hydraulic gradient, and therefore no impact will occur on ground-water resources.

Comment 7: Section 2.16, Page 2-4 - It has come to our attention that the Branford Wire Works were located for many years in the northern reach of the project area. Such an activity would seem likely to have produced considerable quantities of industrial waste products and leachates from open stored raw materials and end products. Were this the case, the abnormally high levels of heavy metals and other pollutants may be found in dredging spoil from this part of the project area. If this were to be true and the spoil material used in the experimental marsh, the entire effort could prove to be self-defeating. The statement does not establish that material of this kind is usable for the stated purpose, i.e., creation of a tidal marsh. To resolve this area of question, we offer the following recommendations: (1) Acquisition and chemical analysis of sediment samples from the potential spoil materials sufficient to establish whether localized concentrations of heavy metals and other industrial pollutants do exist in the project area; and (2) If such concentrations are found to be present, determine whether material of that chemical nature is compatible with the goal of establishing a marsh area having a normal ecosystem. We further recommend that this subject of question and concern, as well as the above recommendations, be discussed in the final environmental statement.

Response: The pollution status of Branford sediments is presented in Table 1 of the Final EIS. Further testing was conducted as part of the pre-operational baseline determination. Dredged material from Branford Harbor was transported to WES and used in propagation studies. Heavy metal levels are not sufficiently high to be limiting to the growth of Spartina alterniflora, and no signs of heavy metal contamination are present. Indications are that a normal marsh system could have been developed on these sediments.

Comment 8: Section 2.73, Page 2-21 - The statement of human occupancy in the area lead us to believe there may well be archaeological resources to be found and possibly adversely impacted in the area of the project. We would urge the Corps to contact the State Archaeologist, Dr. Douglas F. Jordan, University of Connecticut, State Archaeological Museum, Storrs, Connecticut 06268, to determine the likelihood of archaeological resources and follow through with a survey as may be necessary. Although this draft would appear adequate concerning historical site considerations, it is wholly inadequate for consideration of archaeological values. A detailed discussion of archaeological values in the final environmental statement and also a display of Dr. Jordan's comments is desirable.

Response: Dr. Jordan was contacted regarding possible archaeological sites at the study and stated that (15 July telephone conversation between Ms. Jean Hunt, WES, and Dr. Jordan) he knows of no sites in this area; however, this does not mean that sites do not occur there. He recommended that this issue be pursued with the State Archaeological Survey. Please see page A-6 for the follow-up on this recommendation.

Comment 9: Section 4.09, Page 4-5 - As stated earlier, we foresee the possibility of alteration of the tidal currents caused by the enlarged lower end of the proposed marsh and suggest that the enlarged portion be placed at the upper or northeast end of the existing marsh.

Response: The design of the new marsh was changed before project termination. Please refer to the figure on page A-18 of the Final EIS.

Comment 10: Section 4.19, page 4-7 - Although the harbor is closed for the taking of shellfish, young oysters and other shellfish can be relocated to cleaner waters and eventually utilized. Thus, the covering of eight acres of mud flat will be destructive to this potential resource.

Response: Loss of tidal flat acreage which would have occurred is recognized, but as mentioned on pages A-8 and A-14, the most significant resources would have been avoided by the modified project design.

Comment 11: Section 6.30, Page 6-8 - This section neither adequately describes nor considers the alternate marsh development sites. We favor the site at Page's Cove as being more appropriate for marsh development for two reasons. First, the development of a new marsh adjacent to property owned by the Ecclesiastical Society of a local church would not be as destructive to existing resources as utilizing the Pawson Marsh site; and, second, the Pawson site already contains sizeable marsh acreage while the Page's Cove site contains very little.

Response: Discussion of alternate disposal sites has been expanded in the Final EIS; please refer to pages A-12 and A-13.

9.17 United States Department of Transportation, Coast Guard (letter dated June 16, 1975)

Comment 1: Field studies by Scott and Pine (Journal, Water Pollution Federation, Vol. 47, No. 3, March 1975, pp. 553-561), indicated that the maximum dissolved oxygen depression for a dredging project they were studying occurred near the discharge area of the spoil containment area. Paragraph 1.09 indicates that dredging will be accomplished by hydraulic dredging, with material being pumped to two disposal areas contained by dikes. Because the settling efficiency of sediment in the containment area can be related to retention time and particle size, turbidity (and presumably oxygen demand), may be reduced by utilizing long skimming weirs, and by first dredging the finer sediments.

Response: Please refer to paragraph 1.05 and 1.06 of the Final EIS for a discussion of this aspect of dredging. All sediments dredged in this project are fine sediments, and consequently the option of dredging the fine sediments first does not exist. Turbidity within Branford Harbor is characteristically rather high, and it is unlikely that the runoff from the upland disposal sites will increase the turbidity level sufficiently to cause measurable adverse environmental impacts. Therefore, it is believed that installation of long skimming weirs is not justified from the standpoint of environmental impacts.

Comment 2: Paragraph 5.01 states that "... turbidity resulting from dredging in Branford will be masked by background turbidities." While this may be the case visually, it may not accurately describe the situation in terms of physical and biological impact.

Response: This is a recognized problem area, and a portion of research conducted in this study will attempt to further define such impacts. At this time, accurate prediction of physical and biological impact is not technically possible. Refer to Appendix C for a discussion on the background turbidities in Branford Harbor, and paragraph 4.02.

Comment 3: Paragraph 1.09 indicates that earth moving equipment will be used to construct dikes. Oil associated with this equipment may be spilled into Branford Harbor. Spillage of oil and hazardous substances is, however, specifically prohibited by Section 311 of the Federal Water Pollution Control Act as amended in 1972. Measures, including: proper maintenance of construction equipment; arrangement of fuel handling areas so as to permit spills to be contained before reaching the waterway; instructing personnel not to dispose of oil and other such materials into drains or into Branford Harbor directly; and other precautions should be planned to prevent spillage. If, in spite of such planning a spill does occur, the Third Coast Guard District is to be notified immediately at 264-8753 during working hours, or 264-8770 at other times.

Response: Comment noted. Precautionary measures to prevent spillage of oil or hazardous materials will be part of the construction specifications of this work. The Third Coast Guard District will be notified immediately if accidental spillage occurs.

Comment 4: Marshes tend to be ecologically highly productive. As this marsh borders on Long Island Sound, an important habitat for numerous commercial fishes, it is desirable to recognize any significance which these specific dredge disposal areas have to existing commercial fish.

Response: The upland disposal sites will not impact marshlands. The marsh development project should have had a beneficial impact on the existing fisheries, if it had any impact at all.

Comment 5: The timing of spoil deposit operations should be planned so as to have the least impact on organisms which presently utilize the affected aquatic sites. Fingerlings, for example, may be much more prevalent at these sites during particular months of the year.

Response: The dredging will occur during the winter months, a period of low aquatic activity.

Comment 6: The intent of the project to create additional wildlife habitat might not be met if marshland which is shoreward of the disposal sites undergoes ecological succession and is then permitted to be developed. This comment could be addressed in paragraph 4.34.

Response: Pawson Marsh would not have been affected as to salinity, elevation, or drainage, and no ecological succession would have taken place as a result of the marsh project.

9.18 Federal Power Commission (letter dated May 5, 1975)

Comment 1: Review by our staff indicates that the proposed maintenance dredging and marsh development project would not appear to have any significant effect on matters of concern to the Federal Power Commission.

Response: Comment noted.

9.19 State of Connecticut, Department of Health (letter dated May 21, 1975)

Comment 1: The proposed dredging and marsh development should have little or no influence on commercial harvesting of shellfish as the nearest activity is in the Thimble Islands between October and April each year. Recreational harvesting of shellfish between Branford Harbor area and Thimble Islands may be affected temporarily, but we can monitor the water quality during dredging, temporarily closing this portion for the harvesting of shellfish.

Response: Comment noted.

Comment 2: I have asked Mr. Julius Elston, chief of the Mosquito Control Section to comment on the plan and I have attached a copy of his reply. You will note that he feels the report has not adequately provided for mosquito control in the area. He mentions that no control is taken of approximately seven mosquito drainage ditches which carry tidal waters in a northwesterly direction and drain directly into the mud flat upon which a marsh is to be created by this project. In other words, the proposed marsh would effectively block all drainage from those mosquito ditches and result in the trapping of high tide water on the existing marsh, producing large stagnant pools of sheet water. He also feels that approximately ten to twelve acres of the existing Pawson Marsh will be cut off from tidal circulation by the construction of the proposed new marsh. He states that these stagnant areas will produce optimum conditions for the development of Aedes sollicitans, our most troublesome migratory salt marsh species. This species develops many broods each season and is capable of building up tremendous numbers in a relatively short time. Furthermore, this species has been repeatedly found naturally infected with the virus of Eastern encephalitis and is considered the prime vector of Eastern encephalitis along the New Jersey shore.

We, therefore, urge that some other alternate disposal site be used other than the mud flat adjoining Pawson Marsh for the fifty thousand cubic yards of dredged material.

Response: A discussion between Mr. Julius Elston and Dr. Hanley Smith (WES) on 10 July 1975 determined that the project would not increase the population of Aedes sollicitans if the drainage regime on the present marsh was not blocked and if the new marsh was entirely intertidal. The design of the project was modified to assure adequate drainage and eliminate this potential problem. Correspondence from Mr. Julius Elston dated 18 September 1975 and included in Appendix N (page 16) of the Final EIS expressed approval of the project design as modified.

9.20 State of Connecticut, Department of Transportation (letter dated May 13, 1975)

Comment 1: As requested, the Department of Transportation has reviewed the Draft Environmental Impact Statement for the above-referenced project. The draft, as written, appears to thoroughly address all associated impacts with regard to the proposal. However, a more detailed discussion of alternate disposal sites should be included. The development of an experimental marsh and/or wildlife habitat will provide useful information not only from an environmental standpoint but also in the selection of alternatives for future dredging proposals.

Response: Comments noted. A more detailed discussion of alternate disposal sites appears in the Final EIS, pages A-12 and A-13.

9.21 State of Connecticut, Department of Environmental Protection (letter dated July 29, 1975)

Comment 1: The area-wide utility and cost-effectiveness of marsh creation projects as an alternative to conventional spoil disposal methods are not adequately demonstrated in the draft EIS.

Response: Part of the research goal was to evaluate marsh development as a disposal alternative, both for utility or feasibility, and cost-effectiveness. This information is not presently available.

Comment 2: The design of the Marsh Development Project proposed in the Draft EIS may compromise the established policy of the State of Connecticut to preserve and protect its tidal wetlands. About 30% of the 51 acre Pawson Marsh may have its circulation and flushing blocked or inhibited as several tidal creeks will remain obstructed by retaining structures despite culverting.

Response: The project design as stated in the Draft EIS was modified to eliminate any possibility of interference with the integrity of Pawson Marsh.

Comment 3: Twenty acres of the marsh are owned and held in public trust by the State of Connecticut; the remainder is currently privately held. Potential damage to this extensive marsh system, which has been described as one of the best in the State, and the subsequent reduction in value and recreational use of this valuable Marsh unit, is a major concern of this Department.

Response: Comment noted. See above response.

Comment 4: Construction impacts and design specifications for retaining structures are not discussed in sufficient detail in the Draft EIS. Construction of the offshore retaining bulkhead will result in environmental disturbance over a considerably greater area than that enclosed by the dikes. If these retaining structures fail, or permit excessive amounts of sediment to leave the impoundment during or after dredging, considerable damage to adjacent intertidal and marsh areas could occur.

Response: See page A-2 for construction and design details. Construction of the bulkhead would have created a temporary environmental disturbance in the area, but this would have been minimal because of water-based construction. Concerns of project failure are discussed on pages A-10 and A-11.

Comment 5: Ponding, de-watering of sediments and stagnation due to nutrient loading from the spoil material, are not discussed as major problems in establishing a marsh with the particular spoil material at hand. If the retaining structure is permitted to "rot-away" as proposed, the new marsh may be undermined and eroded away. Dike geometry could cause adverse impacts as a result of changed tidal circulation and sedimentary regimes in the experimental area. Project monitoring details and operational considerations regarding the establishment of a marsh flora under the proposed conditions, have been inadequately addressed.

Response: Ponding and de-watering are not considered to be major problems with this dredged material. Nutrient enrichment is discussed on page A-7 under "Chemical Changes". By the time the retaining structure decomposed, the new marsh would have been nearly as stable as the existing one. In addition, the modified project design was less liable to erode than the original. Please see page A-7 for a discussion on tidal circulation. Hydraulic characteristics of the area were to be closely watched by researches. Establishment of a marsh flora is discussed on pages A-2 and A-11.

Comment 6: Given the nature of the dredge materials and the experimental nature of the project, it is doubtful the time available (to August 1977) for the Corps field activities will be sufficient to terminate the project successfully--ie to obtain information on the stabilization of predominantly silty spoil by a viable marsh system.

Response: Two growing seasons were to be studied, and some stability would have already developed at the end of the first growing season. Although long-term information could not be obtained under this program, the methodologies associated with short-term monitoring were such that a university, state agency, or other organization could continue the monitoring.

Comment 7: The U. S. Army Corps of Engineers must address the issue of who will have the legal responsibility for maintaining the experimental project once the Corps and Waterways Experiment Station contractors leave the area. There is no evidence that provision has been made to follow the project through to a successful completion. Pilings remaining once the outer bulkhead rots away may present a hazard to small boats unless removal provisions are made. An unexpected obstruction will be created when the original bulkhead is cut down to the level of the developing marsh--this may also present a hazard to small boating activities in the Branford River Estuary.

Response: Branford Harbor is a Federally authorized project, the maintenance of which has been the responsibility of the New England Division of the Corps of Engineers since 1902. The marsh development project, both during and after construction, as part of the Branford project, would have been the responsibility of the New England Division. If it was determined that the bulkhead presented a hazard to navigation, then NED would have taken steps to see that it was properly identified.

Comment 8: It is clear the Branford study area is "marsh-rich" and "flats-and shallows-poor". While additional marsh would indeed increase primary production locally, the potential for passing marsh production on to higher levels in the food chain would be reduced due to the corresponding loss of flats and shallows. The potential disruption of the dynamic interaction between the existing marsh areas and existing tide-flat and shallows areas should be addressed in the Final EIS in terms of their role in cycling of

nutrients to fin and shell fisheries resources. The role played by the eight acres of flats and shallows to be destroyed by the Marsh Development Project should be placed in perspective within the total economy of the area's wildlife resource base.

Response: The impact of loss of tidal flat acreage is discussed on page A-8. Some of the questions that were to be asked in this research dealt with the relationship between the roles of marshes and tidal flats.

Comment 9: The Draft Statement does not develop or discuss contingency plans for the experimental project; no "acceptable" alternative sites other than the present one, adjacent to a valuable ecological unit, are identified in the draft. The Department believes acdeptable alternative sites should be investigated and evaluated.

Response: Contingencies for project failure from engineering and biological standpoints are discussed on pages A-10 and A-11. A discussion of alternate sites occurs on page A-12.

Comment 10: Our records indicate there is considerable local opposition to the marsh creation aspect of this maintenance dredging project. The rights, interests, and opinions of the owners of the twenty-nine to thirty adjacent and upland private properties directly affected by the experimental project, are inadequately addressed in the Draft EIS. However, we understand the Corps will hold a public hearing on the matter in July.

Response: There was mixed support and opposition to the marsh development project, as recorded in the files at NED. This statement addresses the rights, interests, and opinions of property owners to a greater extent than did the draft (see A-9 through A-12). A formal public hearing was held in Branford on 26 August 1975. Partially as a result of this hearing, the project design was modified to reflect citizen concerns. Consideration of citizen concerns was the over-riding factor in termination of the marsh research. Please note the preface.

Comment 11: Public safety precautions are inadequately addressed. The experimental project will be an attractive nuisance during as well as long after construction and experimentation is terminated. These matters should be addressed in the Final EIS.

Response: See page A-10 for a discussion of public safety during the research. If the project had been completed, the new marsh would have been part of the environment and no more a danger than the present marsh.

9.22 Comments of Citizen Groups and Individuals.

9.23 Harvey C. Anderson (letter dated May 20, 1975)

Comment 1: Let me preface my remarks by saying that I am not opposed to the dredging of the Branford Harbor, however, I am strongly opposed to the Marsh Development in this particular area. My property borders the existing marsh so consequently I am directly affected by this project.

Response: Comment noted.

Comment 2: You have mentioned several times in your statement the impact of surrounding property values. This project will have a decided depreciation of property values. The proximity to the water and the views that it offers are a decided factor on the worth of property values. I happened to develop The Pawson Landing Area and have in my possession cost data showing that the people bordering the Marsh paid substantially more for their property than those not bordering the Marsh.

Response: Comment noted. See page A-12.

Comment 3: The Marsh as it currently exists today offers much recreation for children and adults alike as there are several small tributaries running through it to neighboring rear yards. At high tide these give access to the Branford Harbor. Your plan will be eliminating many of these. Let alone the odor, that this experiment will be throwing off, will make being out of doors unbearable.

Response: The project design was modified so that small boat access to the harbor was maintained. Please refer to page A-9 of the Final EIS for a discussion of odor.

Comment 4: Gentlemen, we in this area are not adverse to experimentation but it just seems logical to the mind that when one experiments he do so in an area that will have no impact upon the citizenry and take away from people what they enjoy and what they have paid for. Some residents in this area in the past few months have worked very hard to see that you do not go ahead with this project in their area and that if you must do this experiment you do it in an area where people will not be hurt by it. Also it seems to me that when this country is being affected with one of the worst economic crisis since the great depression that we can ill afford to spend money on experimental projects such as this. Certainly the people who you are trying to serve cannot let their tax dollars be spent in this area when there is so much to do at this time toward more humanistic goals.

Response: The goals of this project, a portion of the nationwide Dredged Material Research Program, were to determine environmentally compatible alternative methods of dredged material disposal, and to quantify their impacts. Dredging is a vital aspect of waterborne commerce and recreation, but the environmental problems associated with disposal of dredged materials threaten to severely curtail needed dredging throughout the country. This project was one of several designed to provide answers to these problems, and was considered of great importance to the New England area. No research sites typical of New England and not located near residences were available at the time of site selection.

Comment 5: I am not qualified to comment on the technical aspect of your experiment however I have engaged a consultant to do this for me and when I have his comments I shall forward them to you.

Response: Comments noted.

Comment 6: Needless to say the abandonment of the Marsh creation project in this particular area is very important to me and I believe it to be also with my neighbors. I personally will resort to whatever means I must try and stop it.

Response: Comments noted.

9.24 Robert R. Kirkland (letter dated June 4, 1975)

Comment 1: We are not opposed to the maintenance dredging of Branford River channel but are opposed to the creation of a disposal site on the tidal flats so near to our homes and the Corps' disregard of the feelings of local residents in this regard. It is not simply a matter of elimination of open water views but also the disruption of one-third of the tidal flat ecosystem and a consequent depreciation in the value of surrounding homes. This constitutes a form of environmental confiscation without compensation to local residents who paid additional amounts for their property to achieve the present water views. The environmental statement gives no recognition to the fact that the entire marsh creation project is being carried out in an area within 200 feet of homes and will constitute a public nuisance. The health problems in creating an additional disposal site have not been addressed, and there is no mention in the statement of the effects of dumping polluted bottom sediments and sludge near human habitation.

Response: Comments noted. Loss of water view, property values, proximity to homes, health problems, and public nuisance issues are addressed on pages A-9 through A-12.

Comment 2: Section I, 1.08 D - An eight acre marsh will eliminate one third of the tidal flat ecosystem and will block off the existing marsh area in back of the new marsh disposal site.

Response: The project was modified so that tidal flats would be covered by the new marsh. This is about 6 percent of the tidal flats. Drainage from the existing marsh would not have been impeded.

Comment 3: 1.11 - Mr. Hanley K. Smith, Manager of Habitat Development, WES, Vicksburg, Miss., in a letter (Smith to Kirkland, 4/28/75) has mentioned the negotiation of contract for Phase I pre-operational assessment of the existing marsh. At the most, this pre-operational study will include only six months of research before a retaining structure is started and will include no study of late Fall, Winter or Spring ecology or tidal rhythms. This is inadequate research for this kind of project and there is no mention of human environment studies.

Response: It is true that pre-operational studies were to last only six months; however, late fall and winter sampling were to continue at a nearby reference point. Operational and post-operational environmental studies were to continue until September 1977. No human environmental studies as such were conducted at this site; however, the proceedings of public meetings and the views of the local interests have been and will continue to be of great significance in determining the viability of marsh development as a dredged material disposal alternative. Local reaction to the project will be documented.

Comment 4: 1.12 - Phase II, the operational phase, is described in definite terms as to retaining structure, type of materials, etc. It is of interest to note that this detail of specificity is spelled out in the statement, obviously without the benefit of the pre-operational study which, to quote Mr. Smith's letter, will, "... include investigation of several aspects of the study site with emphasis on sediment chemistry, hydraulic characterization and sediment transport..." Shouldn't these factors be considered before making any decisions on proceeding with this plan?

Response: The Branford marsh development project was designed to include the flexibility of modification as new data became available. Several aspects of this project were substantially improved as a result of input from the public, from Federal and State agencies, and from the ongoing research. To assure the best possible project and to deal with unforeseen developments, minor changes in the project design were to continue throughout the study, as necessary.

Comment 5: It is obvious that the drafter of this part of the statement has little real knowledge of the geomorphological features of the existing marsh, expecially that area behind the proposed marsh creation site. The protection of the existing marsh cannot be ensured by a sandbag dike because the marsh front is highly dendritic and embayed. Perigee and storm tides can be both high and with strong currents. No consideration has been given to preventing dredging spoils from silting inland over the present marsh areas and destroying them.

Response: The design as shown on page A-19and described on page A-1 eliminated any potential problems raised in this comment.

Comment 6: The environmental statement downplays the fact that the proposed timber restraining structure will constitute a hazard for boats and, more ominously, will constitute an attractive hazard for children from the surrounding area.

Response: The hazard to boats would have been slight as the structure was not to be in the navigation channel. The potential danger to children is discussed on page A-10 of the Final EIS.

Comment 7: 1.13 - Where were the MIT sedimentation rate studies done? Were they performed in Branford Harbor or elsewhere? If elsewhere, what was average particulate size as compared to average size of material to be dredged from Branford River?

Response: The MIT sedimentation studies were conducted on dredged material from Branford Harbor.

Comment 8: 1.15 - No mention is made of any trial plantings of local marsh plant species on the sulfide rich, polluted type of sludge that will be dredged from the channel. Have such plantings been carried out; if so, where and when, and with what results?

Response: Please see page A-11.

Comment 9: 1.17 - of the home based recreational fleet of 1,075 pleasure craft and 15 commercial vessels, what per cent have drafts of over seven feet? The statistics in this section do not support the need for an 8½' depth channel.

Response: The authorized channel depth is 8.5 feet. No statistics are available regarding the percent of the fleet with drafts greater than 7 feet. In all probability the present shoaling excludes such vessels. However, the determination of dredging a channel to a certain depth is dependent on several factors. One is to insure navigation at all stages of the tide including mean low tide. Another is to obtain a depth that will include a cushion for deeper draft vessels so that they will not bottom out with ground swells or while underway. A third reason is to dredge to a depth that will accommodate normal shoaling without increasing the frequency of dredging.

Comment 10: 1.18-1.21 - The tidal flat is also an important part of the ecosystem and there is no reference to nor study of the adverse effects of substituting marsh for tidal flat. The covering of tidal flats will eliminate large shellfish areas and, in this instance, will eliminate winter low tide feeding for large numbers of gulls and flocks of ducks, especially in the winter.

Response: These concerns are both discussed on page A-8 of the Final EIS.

Comment 11: 1.22 - Will the next step at the next dredging be to take the rest of the tidal flat? This entire project is merely a means to get additional disposal area and will eventually eliminate the beauty of Branford's inner harbor.

Response: The purpose of the research project was to test the feasibility and desirability of marsh creation as an alternative dredged material disposal technique. There is no basis for the assumption that this technique would be used again in Branford. Such a decision would depend on the success and public acceptance of marsh creation and a comparison of this alternative with other disposal techniques which are now under study. Marsh development in Branford is not universally acceptable.

Comment 12: 2.01 - The specific setting for the marsh creation project is in a river embayment surrounded by residential area to the south and the Branford River to the north.

Response: Comment noted.

Comment 13: 2.35;2.38 - Is it typical of the research that has been conducted on this project that no mention is made of the linden (basswood) trees which characterize the upland areas around the site? In fact, the area is known as "Linden" Shore District and "Linden" Avenue is a main thoroughfare. Appendix B, also, does not include any reference to Lindens (Tilia Americana).

Response: Apparently linden (Tilia americana) was not encountered in the sampling conducted by Dr. Rhodes (Appendix D). It is recognized that this species is present and it has been included in the vegetation description (page A-4).

Comment 14: 2.50 - This section, especially the first paragraph, is a good description of the invertebrata subject to destruction by the 8 acre marsh creation project.

Response: Comment noted.

Comment 15: 2.69 - A common basis for community consensus does exist in the surrounding residential area that it is desirable to live near the water, desirable to see the water, and the residents have paid for these amenities. The Corps proposal is counter to the community interest.

Response: Comment noted. See page A-12.

Comment 16: 2.72 - The present estuarine system is biologically diverse and productive. The Corps proposals are "aesthetically" incompatible with the present balance.

Response: Comment noted.

Comment 17: 2.87 - The marsh project is not necessary to the deepening of the channel to 7.5 feet.

Response: True, the existing upland disposal sites have sufficient capacity to contain the dredged material that would be produced if the channel were deepened to 7.5 feet.

Comment 18: Section IV, 4.05-4.13 - A careful reading of these sections will reveal the experimental and environmentally dangerous aspects of the marsh creation project. Of particular concern is the uptake of toxic substances by plants. It is not reassuring to know that this will be part of the study. Shouldn't this be known before the project is attempted?

Response: The subject of contaminant uptake by marsh plants is the subject of considerable research being conducted by the Corps and many other organizations and individuals. This is a complex issue and the research at Branford would have provided an additional and important piece of information. The level of contamination of the dredged material, the relatively small amount of material deposited, and the contaminants already present in the harbor make it unlikely that any change in concentrations of contaminants would have been detectable in animal species consumed by man. It is noted that recreational shellfishing is closed in Branford Harbor.

Comment 19: 4.18 - The immediate effect of this project on wildlife and fishery resources will be significant, then, for Pawson Marsh?

Response: The effects of the project on fish and wildlife would have been of a temporary nature, and largely confined to the immediate project area.

Comment 20: 4.22 - Disagree. This project adds 8 acres of mosquito breeding area and does have an impact on Homo Sapiens who live around the area. This is creation of a nusiance.

Response: The entire project area would have been subject to tidal action and not become a mosquito breeding area. Please refer to pages A-5 and A-11 of the Final EIS for a discussion of mosquito problems.

Comment 21: 4.32 - Odor will constitute a public nuisance and the concentration of volatile sulphur and polluted bottom sediments so close to human habitation is a health hazard.

Response: Please refer to page A-9 of the Final EIS for a discussion of odor. The concentration of the volatile sulphur compounds released at this project would not constitute a health hazard.

Comment 22: 4.33 - Statistically incorrect. The existing tidal flats cover about 20 acres. Eight acres of this area constitutes a 40% reduction in the water vista. The Corps errs in also including water areas of the boat channel and yacht marinas. As to the term, "will elecit an adverse reaction," this adverse reaction is already a matter of record with Corps officials and is not of a passive nature.

Response: Comment noted. The Corps believes that the situation was accurately stated in the Draft EIS.

Comment 23: 4.35 - The Corps admits it will disturb the peace of the existing setting.

Response: Construction of the retention structure would have involved some disruption of normal community tranquility; however, all possible methods to minimize disruption were being considered (see page A-9). Dredging itself will disturb the harbor view for a short period of time, and bulldozers will be operating in the upland disposal areas periodically.

Comment 24: 5.05 - The Corps completely overlooks the deleterious effects of its proposals on land and property values by the loss of 40% of the water view. At the next dredging will the Corps take the rest of the tidal flat?

Response: Please refer to the response to comment 11 of this letter, page 48.

Comment 25: 8.03 - "The loss of 8 acres of tidal flat is an irreversible and inetrievable loss of a substrate. However, the creation of a new substrate, the tidal marsh, will be a source of increased productivity to the river." This statement is not supported by the facts in the environmental statement. There is no analysis of the contribution of the tidal flats to the ecosystem. It must be emphasized that the present marsh structure and tidal forelands have developed naturally and in the Spring are a major spawning area for vertebrate and invertebrate sea life. The dredged sludge with its high content of hydrogen sulfides will block this spawning in the areas covered, and stifle it in the adjacent marsh areas.

Response: Comment noted. The Corps believes that Draft and Final EIS adequately describe the impacts of the research project as proposed.

Comment 26: 9.01-9: - The case made by local residents is understated. The opposition at these meetings has been well reasoned and vocal. The environmental statement omits the probable use of legal means to stop the marsh creation project if it continues.

Response: Comment noted. Please refer to Section IX of the Final EIS for a discussion of opinions of local residents.

Comment 27: A petition of residents against the project has been conducted and a copy of this petition is filed herewith. In addition, the support of local, state and national political representatives against this project is now being solicited.

Response: Comments noted. The petition attached to Mr. Kirkland's letter is included in Appendix L. The petition reads "We the undersigned residents of Branford, Connecticut, enjoy our natural harbor and marsh areas as is, and oppose the marsh creation project proposed by the U. S. Army Corps of Engineers because of its experimental nature, inadequate consideration of ecological and environmental factors, elimination of open water views, detrimental effect on property values and possible health dangers of dumping highly polluted dredging spoils near human habitation in an area subject to wide tidal variation." It is noted that the petition, signed by 520 people, was circulated prior to the presentation of the Draft EIS.

9.25 Frederick J. Collins (letter dated May 12, 1975)

Comment 1: As a resident of Branford living in Pawson Park in an area directly adjoining this proposed marsh-building project, please consider this a very strong protest to this plan.

Response: Comment noted.

Comment 2: This marsh is presently the largest untouched marsh in Branford and the mud flats to be covered contain thousands of bushels of clams and oysters and as presently constituted is probably the largest natural spawning area in the entire northeast. I am familiar with this area as I have done commercial shellfishing in Branford for 35 years and at one time worked almost six months a year on these particular mudflats.

Response: Pawson Marsh has been extensively ditched for mosquito control, and only one small portion on the southwest side of the marsh is untouched. The harbor is now closed to recreational shellfish harvesting and no commercial shellfish operations are underway at the project site. However, the productivity of the site, in terms of shellfish, was under study. Transplanting of the existing shellfish resource would have received careful consideration if existing populations at the site had been endangered.

Comment 3: Various bulkheads that have been built in this area of the Branford River over the years have generally either been carried away or have leaked silt over the adjoining area.

Response: Comment noted. The project was designed to minimize this danger.

Comment 4: I realize it is your responsibility to dredge the River, but I strongly feel that the off-shore spoils areas should be used for the mud and silt to be carried away and such a plan would cause the least environmental impact and in fact may very well be beneficial to lobsters and fish as my experience in the past has been that both fishing and lobstering on and around the Branford and New Haven spoils area improved after river mud had been dumped there.

Response: A major goal of the Dredged Material Research Program, the sponsor of this project, is to determine the comparative environmental impacts of upland, intertidal and open water disposal. Prior to the completion of the Program, including studies such as those proposed at Branford, it will not be possible to judge the environmental desirability of these alternate disposal methods. As a matter of information, field studies into the environmental impacts of various disposal methods are underway at eight other sites. Two of these sites are upland disposal studies and six are marsh development studies. These sites are located throughout the United States.

Comment 5: This experimental project will cost a great deal of money, taxpayers' money, and I strongly urge that this be spent for dredging and using the off-shore spoils areas.

Response: Please refer to the previous response.

Comment 6: Quoting an article in the New Haven Register that you have stated "If the new marsh should be a failure no adverse effect on the existing marsh is expected." - this is of little consolation to those of us who realize that a healthy marsh with all the wildlife that this one sustains should not be subjected to this experiment.

Response: Comment noted. Please refer to pages A-10 and A-11 of the Final EIS for a discussion of the potential impacts of project failure.

Comment 7: I strongly urge reconsideration of this proposed project; and feel compelled to advise my congressman and senators of my feeling on this subject.

Response: Comment noted.

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APPENDIX A
MARSH DEVELOPMENT RESEARCH

INTRODUCTION

As noted in paragraph 1.03 of the text, the maintenance dredging project in Branford Harbor was originally planned to include establishment of a salt marsh on part of the dredged material, in conjunction with the Dredged Material Research Program at the Waterways Experiment Station (WES). Following is a description of the research as it was proposed, the study area, the impacts expected, alternatives considered, and benefits expected.

PROJECT DESCRIPTION

The 1970 River and Harbor Act (Public Law 91-611, Sec 123, sub para. i) authorized the Corps of Engineers to initiate a comprehensive nationwide study to provide more definitive information on the environmental impact of dredging and dredged material disposal operations, and to develop new or improved dredged material disposal practices. WES was assigned responsibility for accomplishment of this research.

The Branford Harbor marsh development project was one of nine field research sites currently under study by WES throughout the nation. At all sites, dredged material is being deposited in a manner such that productive wildlife habitat will result. This is in keeping with comments in the final report of the Long Island Sound Regional Study (New England River Basins Commission 1975) which encourage the use of dredged material in the creation of new wetlands and artificial islands.

The research project would have used between 15,000 and 20,000 cubic yards of hydraulically placed dredged material as a substrate for marsh establishment. Material would have been pumped into a three acre retention structure to be built on the tidal flats adjacent to Pawson Marsh, 20-25 feet from the existing marsh (see map page A-18).

The proposed research effort was designed with four phases: (1) inventory and assessment of the biological, physical, and chemical characteristics of the existing Pawson Marsh, tide flat, and adjacent aquatic environment, (2) operational activities to create a marsh substrate by construction of a retention structure, dredging, and disposal, (3) site preparation and propagation of marsh grass, and (4) post-propagation data collection monitoring.

Phase I, inventory and assessment, was initiated in the spring of 1975. This phase was designed to provide a comprehensive inventory and analysis of the existing biological, physical, and chemical characteristics of the study area in order to document the effects that the proposed marsh development would have on the environment. The inventory was designed to examine sediment chemistry, interstitial water chemistry, water chemistry, hydraulic characteristics and sediment transport, marine communities (benthos, plankton, nekton), heavy metals in selected organisms, marsh vegetation, and vertebrate and invertebrate fauna. A monitoring program based on this inventory and assessment was to continue throughout Phases II and III.

During the operational phase, Phase II, a suitable substrate for marsh grass establishment was to be obtained. A timber retaining structure about 1,400 feet at its perimeter was to be constructed to confine and initially stabilize the dredged material. The structure as planned consisted of vertical timber piles and horizontal lagging. The piles would have been driven to sufficient depth (approximately 33 ft.) and have appropriate spacing (6-8 ft.) to resist water and soil pressure forces exerted upon the lagging. The piles were supported by helper piles and anchor rods, as shown in the diagram on page A-19. At least two weirs were to be placed in the wooden retention structure, and removable stoplogs used to provide control of the height of the weirs. Silt curtains were to be placed along the outside of the weirs to prevent turbidity in the harbor, which might occur as a result of effluent from the retention structure.

The hydraulic dredge was to pump dredged material into the study area during the rising tide, and cease pumping as the level of slurry neared the top of the retention structure or if an abnormally high tide threatened to overtop the structure. The area would have drained through the adjustable weirs as the tide receded. Studies by the Massachusetts Institute of Technolcgy (MIT) have shown that the average sedimentation rate of the dredged material is greater than the average rate of tidal fall within the containment area. This would have allowed relatively sediment-free surface water to be drained off. In addition, weir height was adjustable to help control settling rates. The substrate and the retention structure would have been instrumented to allow control of critical aspects of the dredging and filling operation, including settlement plates, pore pressure measurers, and slope indicators.

As the study area filled with sediment, the slurry capacity of the area would decrease. The elevation of the weirs was to be maintained slightly above the elevation of the edge of the newly placed dredged material for the majority of the filling operation. The weirs were to be closed as the dredging phase neared completion to allow enough dredged material to be confined so that, upon consolidation, the surface within the retention structure would be intertidal (+5 ft.). The structure would then be lowered to that elevation. Research at MIT indicates that initial consolidation of the dredged material would have occurred rapidly, and the wooden retention structure could be cut down to the elevation of the dredged material within a month of dredging. Dredging would have been completed by May 1976.

During Phase III in the spring of 1976, the site was to be seeded with salt water cordgrass (Spartina alterniflora). The rate of seeding and any seed treatment necessary, such as fertilization or seed innoculation, was to be determined during laboratory tests performed on Branford River sediments during the winter of 1975. As a back-up to an unsuccessful seeding, established seedlings were to be available for vegetating the site. Both methods of salt marsh vegetation establishment are proven techniques.

To document the effects of the newly developed marsh upon the environment, a monitoring program (Phase IV) was planned. The monitoring program was to

be an extension of Phase I and continue until September 1977. In addition to short-term, immediate effects, the monitoring program would identify and evaluate longer term effects and the relative biological success of the new marsh.

ENVIRONMENTAL SETTING OF THE PROJECT

The environmental setting of Branford Harbor is discussed in Section II Additional site specific information is presented here.

GEOLOGY AND SOILS

The area of Indian Neck, which includes Pawson Marsh, consists of a rock-controlled feature mantled by variably thick deposits of till. Rock is exposed at the shoreline almost continuously along the eastern shore and the island to the south. A more extensive area of thinly mantled bedrock provides the primary geologic control in the area of Indian Neck Point. Thick swamp deposits cover most of the northerly side of the peninsula in the area of the study site. These deposits, consisting of peat and peaty mud, form crudely wedge-shaped bodies that thicken seaward. The seaward portions of these tidal marshes are normally underlain by gray, shell-bearing estuarine mud, while their landward parts are underlain by alluvium. These relations indicate that the Connecticut coast has been undergoing gradual submergency by sea level rise, land subsidence, or both. Salt marshes, which naturally exist on soils in the upper one-half to one-third of the tidal zone, are in a precarious position. Their existence is dependent upon the balance between the deposition of new sediments and a rising sea level with the system being buffered somewhat by the action of the marsh community itself.

Pawson Marsh in Branford Harbor is a deep marsh as defined by Hill and Shearin (1970), i.e., "silty salt grass peat over deep silty sediments, containing greater than 10,000 ppm salt". (A description of such marsh soils, Westbrook Series, is given in Appendix B.) Although the stability of Pawson Marsh is not well documented, soil tests on the mud flats along the eastern portion show that the material has been preconsolidated.

VEGETATION

The vegetation of Pawson Marsh is typical of the saline marshes surrounding Long Island Sound, for the most part. A vegetation map (page A-20) was prepared from reconnaissance transects taken on 24 November 1974. Voucher specimens of the marsh plants were taken and are on file at the Louisiana Tech University Herbarium, Ruston, Louisiana. Detailed sampling by researchers from Connecticut College began in late spring 1975.

The lower marsh along the open-water areas and streamsides is dominated by tall salt water cordgrass. Large expanses of the marsh in back of this are covered by intermediate cordgrass. Farther into the interior is salt meadow hay (Spartina patens), spikegrass (Distichlis spicata), and varying amounts of glasswort (Salicornia europea). The higher marsh is vegetated

with salt meadow hay and stunted cordgrass pannes. Marsh-elder (Iva frutescens) is present, along with sea lavender (Limonium carolinianum), glasswort, blackgrass (Juncus gerardi), and blackgrass with spikegrass. Some areas of the marsh edge support reedgrass (Phragmites communis) and bullrush (Scirpus robustus). Preliminary indications are that the peak standing crop of bay front and creek bank cordgrass will be over 2,000 g/m^2. The average of all cordgrass is expected to be greater than 1,500 g/m^2.

The upland sites surrounding Pawson Marsh adjacent to the residential areas contain several species of oaks, along with beech, maples (Acer spp.), paper birch (Betula papyrifera) and linden (Tilia americana) in the overstory with edge and understory composed of staghorn sumac (Rhus typhina), hophornbean (Ostrya virginiana), mulberry (Morus spp.), silverberry (Eleagnus umbellata), and Japanese honeysuckle (Lonicera japonica). A small knoll extending onto the marsh has become vegetated with species indicative of higher and drier sites including marsh elder (Pyrus spp.), red cedar (Juniperus virginiana), common yarrow (Achillia millifolium), bittersweet (Solanum dulcamara), and salt marsh goldenrod (Solidago sempervirens). Succession of vegetation on this portion of the marsh appears to be indicative of successional patterns which can be expected when marshes are filled.

INVERTEBRATES

Important components of any wetland ecosystem are the invertebrates. These organisms provide a source of food for larger invertebrates and many vertebrates, and contribute to detrital production by their feeding activity. Preliminary sampling by researchers from Connecticut College and Marine Sciences Institute show Pawson Marsh and portions of the tidal flat to be very productive.

The tidal flat is primarily a sea lettuce-amphipod-mud snail community, with oysters increasing in importance as the substrate gets firmer toward the channel. Mud along the bayfront and tidal creeks supports up to 4,000 ribbed mussels (Modiolus demissus) per square meter, with an expected average of 2,000/m^2. Also present are smooth mussels (Mytilus edulis), mud snails (Nassarius obsoletus), moon snails (Polinices sp.), sea anemones (Nematostella sp., Halipcannella luciae), clam worms (Nereis succinea), and several species of amphipods. A few soft-shelled clams (Mya arenaria) have been found, along with hard-shelled clams (Mercenaria mercenaria), green crabs (Carcinus maenas), blue crabs, mud crabs (Panopeus herbsti), and rock barnacles (Balanus balanoides). While some of these animals are sessile, others like the crabs move across the tidal flat with the tide. Hydrobia sp., a snail, is in pools of water. Prawns (Palaemonetes sp.) are found in the mosquito ditches and channels, as well as on the flats.

Pawson Marsh itself is rich in total numbers of invertebrates and in species diversity. The salt marsh snail (Melampus bidentatus) is most abundant on the short cordgrass and salt meadow hay, and rough periwinkles (Littorina saxatilis) in the tall cordgrass. Also present are common periwinkles (L. littorea), amphipods (Gammarus palustris, Orchestia grillus, O. uhleri), and marsh crabs (Sesarma reticulatum). Fiddler crabs (Uca

pugnax and U. minax) are extremely abundant throughout the marsh. Representatives of three families of spiders have been collected. Among the insects, flies (Diptera) were the most abundant in the sampling quadrats, with ten species recorded. Planthoppers (Homoptera) were abundant, and the plant bug (Trigonotylus sp.) relatively abundant in tall cordgrass. Grasshoppers (Conocephalus spp.) are common to abundant in all areas of the marsh. No larvae or adult mosquitoes have been found.

FISHERIES

Populations of fish in the area were examined in summer of 1975. Species sampled from over the tidal flats included American eel (Anguilla rostrata), sheepshead minnow (Cyprinodon variegatus), mummichog (Fundulus heteroclitus), striped killifish (F. majalis), and four-spined stickleback (Apeltes quadracus). Those taken in the tidal channels were sheepshead minnow, white perch (Morone americana), and young and adult mummichog and striped killifish.

REPTILES AND AMPHIBIANS

Almost all amphibians and many reptiles rely heavily on wetlands for some stage of their life cycle; however, few can tolerate saline waters (Goin and Goin 1962). The northern water snake (Natrix sipedon) is semiaquatic and can live in brackish water marshes. Diamond back terrapins (Malaclemys terrapin) are often found in tidal waters and salt marshes. The eastern mud turtle (Kinosternon subrubrum) and the common snapping turtle (Chelydra serpentina) are also often observed in brackish habitats (Conant 1958); (Appendix H). An eastern box turtle (Terrapene carolina) was observed on the high marsh at Branford.

BIRDS

A list of birds which have been seen frequenting Branford Harbor and the marsh itself is in Appendix I, courtesy of Noble S. Proctor of Branford. The following information was collected by Connecticut College researchers in 1975.

Although Pawson Marsh lacks the tall grasses necessary for good breeding habitat, three species did nest. Two pair of clapper rails (Rallus longirostris) nested in intermediate cordgrass; 13 eggs hatched from one nest in July. Three to five pair of sharp-tailed sparrows (Ammospiza caudacuta) nested, apparently in the salt meadow hay. In the cordgrass, 10-15 pair of red-winged blackbirds (Agelaius phoeniceus) nested. Purple martins (Progne subis) bred at the marsh edge and were seen feeding in the marsh.

Several sets of migratory birds visited the marsh, including two merlins (Falco columbarius), two sparrow hawks (F. sparverius) and a peregrine falcon (F. peregrius). The falcon was seen hunting the river in August 1975. A ruby-throated hummingbird (Archilochus colubris) was observed. Swallows were abundant, including the tree (Iridoprocne bicolor), bank (Riparia riparia), barn (Hirundo rustica), and cliff swallow (Petrochelidon pyrrhonota). Shorebird migration from the first week of July to the third week of August provided

a list of a dozen species, including the solitary sandpiper (Tringa solitaria).

The marsh is an important feeding ground for yard and garden birds such as blue jays (Cyanocitta cristata), catbirds (Dumetella carounensis), and orioles (Icterus spp.). A belted kingfisher (Megaceryle alcyon) appeared in July and will probably over-winter. Gulls and terns are common to the area, along with ducks and geese. As many as 12 great blue herons (Ardea herodias) and 12 snowy egrets (Leucophoyx thula) have been seen feeding on the tidal flats. In the uplands to the east of Pawson Marsh, there are roosts of green herons (Butorides virescens) and black-crowned night herons (Nycticorax nycticorax).

MAMMALS

In Pawson Marsh, the meadow mouse (Microtus pennsylvanicus), white-footed deer mouse (Peromyscus leucopus) and house mouse (Mus musculus) have been trapped, along with an unidentified shrew. These are an important food source for mammalian and avian predators, although population levels are currently low. Several Norway rats (Rattus norvegicus) have been trapped. A female muskrat (Ondratra zibethicus) and her young have been seen swimming in a mosquito ditch on two occasions. An opossum (Didelphis marsupialis) has been seen, and sign of domestic cat (Felis catus), domestic dog (Canis familiaris), striped skunk (Mephitis mephitis), and raccoon (Procyon lotor) has been noted. Raccoons, dogs, and cats are the most significant predators on the marsh. Rabbits (Sylvilagus sp.) are a popular game animal in upland habitat, but have not yet been seen in the project area. In winter, furbearers including mink (Mustela vison) and muskrat may be trapped in the Branford Harbor area.

ARCHAEOLOGY

On 10 September 1975, Dr. Frederick Warner of Connecticut Archaeological Survey, Inc. and Mr. Nick Bellatoni dug four test pits on the tidal flats in the vicinity of the proposed marsh. No archaeological resources were found. Soil borings stored at MIT (Civil Engineering Department) show soft sediments to a depth of 25 feet. It is highly unlikely that archaeological resources would be found above 15 feet in these sediments, and recovery below 15 feet is not economically feasible (see page K-2).

IMPACTS OF THE MARSH DEVELOPMENT RESEARCH

Although few adverse impacts were expected as a result of the salt marsh development, a number of issues and potential impacts were raised by individuals and agencies interested in the project. These issues are summarized and answered below.

PHYSICAL - CHEMICAL

Turbidity. An increase in turbidity in the harbor might be expected as a result of effluent leaving the containment area. The dredged material would have been pumped into the retention structure generally on the rising tide. Studies of Branford Harbor sediments indicate that the sedimentation

rate exceeds the average rate of tidal fall and therefore relatively sediment-free surface water would have been drained. The adjustable weirs would have allowed increases in ponding time and more efficient sedimentation. As an additional measure, silt curtains were to be placed along the outside of the weirs. These precautions together with the relatively high background turbidity of Branford Harbor waters lead to the conclusion that marsh development would not have created significant turbidity at this site.

Current Patterns. Current patterns across the tidal flat would have been altered by the new marsh. These alterations were not expected to adversely affect current patterns in Branford Harbor or to adversely impact the existing marsh. They would have been included in the packet of items to monitor.

Drainage. Blockage or alteration of the drainage patterns of Pawson Marsh as a result of construction for the new salt marsh could harm Pawson Marsh and its attributes in a number of ways. However, since 20-25 feet were to separate the two marshes, and since construction was to be water-based, the marsh project would have in no way affected drainage of Pawson Marsh. Drainageways in the new marsh were expected to establish themselves. If they did not, and if it was deemed necessary, drainageways would have been dug.

Chemical Changes. Qualification of chemical changes in Branford Harbor as a result of the new marsh would have been the subject of a portion of the research in this project. Background levels of chemical constituents associated with this dredged material are already high in the harbor and sensitive techniques would have been required to detect significant changes. Chemical enrichment of Branford Harbor as a result of this research was not expected to be significant and would not have endangered existing natural amenities or cultural values.

Contaminant Mobilization. Marsh plants are known to accumulate contaminants from polluted dredged material, and these contaminants may be released, through detrital decomposition, into the ecosystem and accumulated in other life forms. These processes were to be the subject of investigations associated with the planned research. It is important to note that the level of pollutants in the dredged material and the amount of material utilized was sufficiently small that mobilization of contaminants into the food chain as a result of this project did not constitute a health hazard to the human population. Increases in contaminant levels in lower life forms, if they occurred at all, would have been small and their measurement would have required sensitive analytical techniques.

Pawson Marsh Without the Project. The Pawson Marsh is approximately 60 acres in size. Peat cores and other samples taken in summer of 1975 show that the west edge of Pawson Marsh is undergoing accretion. Indications are that the east side is probably accreting also. If existing and proposed shoreline management requirements and regulations are enforced, the existing marsh is not expected to undergo physical changes by man's activities.

BIOLOGICAL

Pestiferous Insects. If drainage of either Pawson Marsh or the study site

was not maintained, there could be an increase in biting, disease-bearing, or otherwise pestiferous insects in the area. Since drainage was to be maintained through proper elevation and exposure to tidal action, no new breeding habitat would have formed.

Reedgrass. This plant is a common invader of filled lands removed from the influence of tidal action. No changes in elevation or salinities of the existing marsh would have occurred, and therefore, there would have been no advance of the present reedgrass population. Since the study area was to be intertidal, habitat for the reed would not have developed.

Soil Microbes. There was concern that placement of dredged material so near to residences would be a health hazard. Disease-causing organisms are found in soils everywhere, and may be expected in sediments to be dredged. Since disease may only result from ingestion or deep penetration (puncture wound) of large numbers of microbes, no health hazard was seen.

Loss of Tidal Flats. Three acres of tidal flat and its associated fauna and flora would have been replaced by the new marsh. Both marsh and tidal flats are considered valuable biological resources and there is no accurate method by which the magnitude of this trade-off could be quantified. Many knowledgeable scientists would argue that the value of the marsh exceeds that of the tidal flat, and many would assume an opposite position. Placement of the study area did avoid the most significant invertebrate populations (see page A-4). Since only about six percent of the tidal flats was to be covered, loss of the less significant populations was not considered serious.

Shellfishing. Branford Harbor was formerly a commercial shellfishing area, but is currently closed to recreational shellfishing. Oysters can be commercially grown in the harbor and transplanted to clean waters for "cleansing" before harvest. Should the water quality of the harbor improve in future years recreational shellfishing could return. The tidal flat upon which the marsh was to be placed has an elevation of approximately one foot above mean low water. Although the area supports oysters, this elevation is above that generally utilized for commercial oyster beds.

Sport and Commercial Fisheries. Both tidal flats and marshes are important components of the habitat of many sport and commercial fish species. The loss or gain of three acres of either would not have had a measureable impact on this resource in Branford.

Wildlife. The activities associated with the salt marsh development project would have impacted waterfowl, shorebirds, and wadingbirds primarily. Birds would have been disturbed during the actual construction phase and some species would have avoided the area during this operation, both minor and short term impacts. The trade-off of tidal flat for marsh would have increased habitat for some species and decreased it for others, leading to a shift in species use patterns in the immediate area of the project. Due to the small acreage of the study area, this shift would have been difficult to quantify.

SOCIAL

Proximity of Residences. A great deal of opposition to the marsh project came from residents living in the vicinity. The edge of the new marsh was to be nearly 500 feet from the nearest permanent residence. Several residences are within 1000 feet of the site as proposed.

Disturbance. During construction and dredging, there would have been some disturbance from noise and unaccustomed activities. Pile-driving activities would have been the most disruptive aspect of this effort, although a vibratory pile driver was to be used in order to avoid the disturbance caused by steam hammer pile drivers. The pile driver would have operated periodically during the daylight hours. The noise level of this operation is about 65 decibels at 500 feet, which roughly corresponds to that experienced during normal conversation. The dredging activity, which is not obtrusively noisy, would have disturbed the view of the harbor. Construction and dredging were scheduled to be conducted in January through April, a time in which houses would have been closed up with storm doors and windows, further reducing disturbance from noise. Construction was to be water-based; consequently the residential community would not be disturbed by movement of a great amount of construction equipment.

View. The harbor vista would have been disturbed primarily during the first six months of the project. The retaining structure was to be built to an elevation of +7, six feet above the existing tidal flat. A month after dredging the structure would have been lowered to +5. A 4-foot wooden bulkhead would then be visible from the water side of the marsh during low tide, progressively less visible as the tide rises, and ultimately covered by water at high tide. From the upland edges of Pawson Marsh the low angle of view that exists would have resulted in less of a visual obstacle. The area was to be planted in the spring of 1976, and the grass would have been fully grown by the end of the summer.

By increasing the size of the existing 60 acre marsh by three acres (five percent) the area of open water would have been reduced correspondingly. Six homeowners would have had up to 40 percent of their water-view replaced by the new marsh. The wooden retaining structure would have had a design life of about ten years. Within five years the new marsh would have been sufficiently established so that removal of the structure would leave a face similar to that which now exists at Pawson Marsh. If the structure was left in place, its gradual deterioration would be accompanied by a replacement with such a face. If removal of pilings after the structure had deteriorated was desirable, it could have been done by cutting them off at the elevation of the tidal flat.

Odor. A marine odor would have been evident during pumping operations, with hydrogen sulfide a component of this odor. Odor would be most evident during the actual pumping operation and not exceed ambient conditions at the termination of the dredging phase. The intertidal placement of the dredged material would have substantially lowered the odor levels compared to upland disposal. Other factors that would have substantially lessened the odor impact are reduced microbial activity because of low temperatures during the dredging phase (winter), and dispersion of odors by wind.

Safety. The retaining structure, construction operations, and newly deposited sediments might have attracted children to the study area and presented potentially hazardous situations. Two conditions existed to minimize these dangers: 1) few children would be able to reach the construction by water in the winter as boats are not readily available, and crossing the marsh and tidal flats to the site would be difficult, cold, and generally uncomfortable; and 2) if considered desirable by community standards, a watchman was to be employed during the daylight hours after school and on holidays and weekends from the beginning of the filling operation until the site was vegetated.

Reedgrass is a fire hazard, endangering both health and property. As noted before, however, this hazard would not have increased because of the marsh project.

Project Failure. Considerable concern was voiced regarding the prospect of project failure, and the accompanying harmful aspects which might be incurred by the areas' natural and economic values. All known concerns and precautions taken are discussed below.

Structural or design failure would occur if the containment area failed to hold the dredged material. There appeared to be three ways in which this could happen: 1) if the structure, or part of it, failed and the material could flow out; 2) if material was removed from the containment area by a severe storm; and 3) if material would move under the retaining structure. The possibility of the containment area not holding the material through either of the first two situations was extremely remote. The structure was designed with a considerable safety factor, and its stability was to be closely monitored. Should a severe storm event have breached the containment area and removed the newly deposited materials, it is probable that the sediments would have returned to the channel. The prospect of a great bulk of dredged material being transported to the marsh and deposited a sufficient depth to do permanent harm to the marsh and effectively create a new land form was extremely remote. It is noted that consolidation tests on this dredged material indicate that except for the upper foot, the new marsh sediment would have had a consistency similar to the existing tidal flat within a few months of deposition. The vegetative cover to be established in the spring of 1976 would have added substantially to the strength of the substrate, and within a few years the new marsh should have been as stable as the existing marsh.

Construction and filling on a soft foundation always does present the possibility of mud wave formation. The wooden retaining structure would have been set one foot into the tidal flat, substantially reducing potential mud wave formation or seepage under the structure. It is noted that foundation studies on the tidal flat indicate that preconsolidation has occurred; this additional foundation strength also reduced the possibility of mud wave formation. Lateral migration of these sediments was expected to be minimal. Seepage under the retaining structure would not have been significant because of the relatively low permeability of the foundation materials. Measurements of pore pressure inside and outside of the confinement would have been taken. If these measurements showed danger of a mud wave, filling was to be stopped.

In the unlikely event that the containment structure, for whatever reason,

did not hold the dredged material and a new marsh substrate was not attained, the structure was to be completely removed.

Some slumping of the new dredged material was considered possible because of foundation conditions. Should this have happened, the effect would be to establish some fraction of lower marsh or tidal flat within the containment area, which would produce a more diverse marsh habitat.

Marsh plant establishment on soft sediments is a proven technique. Salt marsh cordgrass is growing on intertidally placed dredged material in the Branford area, and has also been established on sites in New Jersey. In order to anticipate any problems regarding the ability of the sediments to support cordgrass, dredged material from the Branford River was transported to WES for propagation studies. Seeds planted in mid-July 1975 germinated. Seedlings transplanted from Long Island grew well, and exhibited no signs of nutrient deficiency or reaction to toxins. These propagation studies were to continue over the winter, and the results applied to the planting design.

Pestiferous Insects. This consideration was discussed on page A-7. As noted on page A-5, no mosquito larvae or adults were found in Pawson Marsh sampling. A letter from the Connecticut Department of Health (page N-16) expressed approval of the three-acre site from a public health standpoint.

Polluted Dredged Material. Concern was voiced over the danger of placing polluted dredged material near residences. The pollutional status of the Branford Harbor dredged material is not sufficiently high to have increased the health hazard to Branford residents beyond that which presently exists in the waters of the harbor. Contaminent uptake and mobilization into the ecosystem as a result of this project could not reasonably be considered a threat to humans because of the small amount of dredged material to be placed at the study site, and the lengthy biological pathways from dredged material to human consumption.

Cultural Elements. Cultural resources in the area must be considered. No known historical resources would have been affected by this proposed project, and no archaeological resources are thought to be present in the marsh development area (Appendix K). As noted in paragraph 2.54, Branford is in the Long Island Sound "scenic viewshed" category. It is recommended that lands in this category be subject to review and control of growth designs. No conflict between this recommendation and the marsh development project was seen.

AESTHETICS

The aesthetic value of the land, marsh, and water complex that is Branford Harbor is difficult to deal with because the evaluation of the whole setting or any element within the setting is highly subjective. A common basis for community consensus often does not exist or is, at least, difficult to measure. However, if real estate values and population density are any indication, it is desirable to live near the water and very desirable to be able to see the water. The scenic qualities of Branford are recognized.

Aesthetic value is also found in the psychological images caused by knowledge of the existence of a beneficial natural system functioning in a "healthy" manner. The maintenance of a biologically diverse and productive estuarine system is gratifying to those who perceive the intrinsic value of the natural world and appreciate the service that the natural world performs for a technological society. Pawson Marsh is part of such a system.

Property Values. Any adverse impacts resulting from the concerns just discussed which occurred or threatened to occur, in spite of measures taken to prevent them, could affect property values in the immediate area. The impact of most concern is view. One of the primary reasons people build and live along the coastal shoreline is the view afforded by the water-land interface. Consequently, a change of configuration in this interface might negatively affect property values, although any loss would not be compensable unless a property was physically affected by the taking above mean high water.

ALTERNATIVES CONSIDERED

In planning the marsh development project a number of alternatives were available, beginning with site selection and ending with specific project design. These alternatives are described below, along with their positive and negative aspects, to aid the reader in understanding the evolution of the project and its importance to the WES research program.

SITE SELECTION

At the time of site selection of a New England study area, two rivers other than Branford were considered by WES - the Connecticut River and the Housatonic River. The Connecticut River had no suitable sites, and the dredging schedule for Housatonic was uncertain. Branford River was left as the only project available in which WES could participate, due to time, geographic, and geological constraints. The schedule of dredging fit the WES time frame, allowing completion of all phases of the research, from baseline data collection through final monitoring. The location of Branford Harbor added geographic representation to WES nationwide site selection, and the coastal saline marsh situation added an important facet to the WES program.

In addition to Pawson Marsh, Page's Cove and Lindsey Cove were initially considered feasible as study areas (See Figure 1 on page 2). Page's Cove was rejected as a site primarily because a swimming beach is located on the east side of the cove. Since the project would have destroyed the beach, attempts to gain permission for deposition were discontinued. In addition, the bulk of the material to be dredged is upriver from Branford Point, a straight-line distance of approximately 5,500 feet. Actual pumping distance would be a minimum of 7,000 feet, and would require crossing private property, a city road, and a topographic elevation of at least 28 feet. To pump material that distance and height would require two booster pumps, which would multiply dredging costs at least two times.

Lindsey Cove was rejected as a site because of its open configuration, with almost total exposure to the weather conditions of Long Island Sound. Minimal protection is offered by Indian Neck Point and feasibility of establishing marsh under these extreme conditions is poor. Also, such an open site would reduce the ability to determine impacts of a marsh development

project, since the impacts would be widely dispersed.

Two conditions present at Branford and not found at any of the other WES sites are fine-grained sediments to be dredged and stabilized, and weak foundation material. These two conditions would require a high degree of engineering skills in order to assure proper design of a retention structure and placement of dredged material. Three other factors made Branford Harbor appear to be a desirable study site. The tidal range and sheltered location of the potential site provide a low energy regime, making marsh establishment feasible. The existing marsh could provide a seed source for colonizing the new sediments. Configuration of the area would allow deposition of material over an acreage large enough to allow careful and continuous monitoring.

In summary, Branford Harbor was chosen as one of the nine nationwide areas for research for the following reasons: (1) its favorable technical aspects such as physical configuration, low energy regime, and confined study area; (2) its applicability to other areas in New England; and (3) its location adjacent to an authorized Corps dredging project providing a "real life" study medium.

PROJECT DESIGN

In addition to the final design described on pages A-1 and A-2, several variations were considered including those of size, configuration, and location. One variation was the design recommended in the Draft EIS and further detailed in the Proposed Final EIS; the others were considered as a result of comments on that design.

The original design was an eight-acre semicircle attached to the point of land on the northeast edge of Pawson Marsh and tied into the existing marsh at a point about 1,200 feet to the southwest. This design would have used 40,000 cubic yards of dredged material, increasing the size of Pawson Marsh by 13 percent. The retaining structure consisted of two parts. One was a wooden bulkhead 1,600 feet long on the bay side of the semicircle. The other part was a sandbag dike running the length of the marsh edge and forming the back of the semicircle. Construction details of the original bulkhead were the same as those on page A-2 with the exception that only one weir would have been used. The only operational difference was not having to provide tidal drainage for the existing marsh.

The eight-acre site, which would have accommodated nearly half of the sediments to be dredged from the harbor, would also have allowed for a ponding area large enough to increase the settling and consolidation rates of the dredged material. In addition, the size of the area closely approximated a typical disposal site in New England as well as being large enough to allow detection of environmental impacts of marsh development with relative ease. Another beneficial aspect would have been the knowledge gained from connecting the new marsh to the existing marsh, in particular, maintaining drainage of the existing marsh and establishing new drainage patterns through the marsh extension.

Negative aspects of this design included the possibility of erosion around the fastland tie-in. The portion of the tidal flats with the

highest number of invertebrates would have been covered by either the sandbag dike or dredged material. Construction of the sandbag dike would have been labor-intensive and costly, and great care in project design and construction would have been necessary to avoid damage to the existing marsh. The size of eight acres was opposed by some residents of Branford and other individuals. The configuration and placement of this design would have interfered with the water view of local landowners.

Various combinations of the following were examined as alternatives to the original design: sizes from 8 to 1 1/2 acres; locations on the tidal flat from the east to the west side of Pawson Marsh; configurations ranging from ovals to semicircular shapes; and orientations from islands to partial or full attachment to the existing marsh. The combination considered most desirable from a technical and aesthetic standpoint was selected and is described in this Appendix. It was selected over other alternatives for the following reasons: 1) three acres was more acceptable to those not in favor of the project than a larger acreage; 2) the study area fit the configuration of the marsh, allowing a natural appearance; 3) it left the most productive portion of the tidal flats uncovered; 4) since it was not tied to fastland, potential for erosion was reduced; 5) the existing marsh could not have been damaged by blockage of drainage, leading either to an increase in mosquito populations or reedgrass; 6) since easy access to the site was removed, any safety hazards present were greatly reduced; 7) the amount of tidal flat and marsh interface was significant, which is of great research interest; and 8) the isolation of the study area would have made monitoring of impacts easier and more significant.

VARIATIONS OF CONTAINMENT

In addition to the recommended containment structure for the proposed marsh development in Branford Harbor, three other concepts of construction were considered. The following discussion summarizes these three concepts.

The first concept which was considered was single-stage land-based construction of an earthen dike. To construct this structure embankment material would have been transported directly from a source to the site by truck and dumped into place. Extension of the dike would have occurred as each truckload of material was placed by backing loaded trucks along the embankment created by previously dumped material. Since the dike embankment would have provided access to the "dump point", virtually no new haul road would have been required. Existing roads, however, would have required upgrading and/or recurring maintenance to accommodate heavy trucks during construction. Final sloping of the dike could have been accomplished by a small dragline, working from atop the embankment. Installation of an effluent control structure could also have taken place from the embankment crown, thereby minimizing direct disturbance to the surrounding marsh.

To contain an eight-acre marsh development site, this structure would have consisted of an embankment 3,000 feet long and ten feet high above the tidal flat. The slope of the embankment would have been 1 on 4, and the top width approximately eight feet. The construction material would have been of a sandy granular nature. The actual total volume of the emergent dike was to have been approximately 57,000 cubic yards covering

an area of 6.5 acres. To reach the desired dike configuration, an additional 20,000 to 40,000 cubic yards of material would also have been required due to the consolidation and displacement of underlying soil that would have occurred during construction. Following construction, the top of the dike would have been lowered to insure that the newly developed marsh could be subjected to normal tidal and wave action.

The single-stage land-based construction alternative to the containment structure was rejected for two basic reasons: the excessive amount of fill material and tide flat area required for construction activities to achieve the desired embankment; and the social impacts associated with the construction activity which would disrupt the local community activity patterns and impair the aesthetic quality of the natural marsh setting.

The second concept which was considered was two-stage land-based construction which is essentially the same as the single-stage method described above with the following differences. In the two-stage method, the material would have been transported to the site by truck and dumped to form a relatively wide layer of material about 140 feet wide and 6 feet deep. As in the preceding method, no new haul roads would have been required since the dumped material would have provided access to necessary points as the construction proceeded. Subsequently, after passage of sufficient time for the required strength gain and consolidation of foundation soils, material would have been transferred via dragline operation from the inner edge of the 6-foot fill to achieve desired embankment height. The physical dimensions of the final structure would have been similar to that of the single-stage method. The height would have been 10 feet; however, the slope would have been steeper (1 on 3). The construction material would also have been of a sandy granular nature. The crown would have been about 15 feet wide and the actual total volume of the emergent dike was to have been approximately 53,300 cubic yards. The initial 6-foot fill would have covered 10.1 acres but would have been reduced by the dragline operation in the second stage to 5.5 acres.

Although this concept would have reduced material requirements, the savings would have been offset by increased construction costs. Consequently this method was rejected for essentially the same reasons as single-stage land-based construction.

The third concept was water-based construction of the dike from the bay side of the marsh. This method would have consisted of the following steps: (1) transport fill material by truck from the source to a loading dock about five miles from the project; (2) transfer material to barges; (3) barge material to the site; and (4) transfer material from barge to embankment. Steps 3 and 4 would have presented some serious operational difficulties, as the shallows surrounding the site would have prevented the approach of a material-laden barge. To relieve this problem, a storage pocket for dike material near the existing navigation channel in the general vicinity of the site would have been excavated. Material from the barges would then have been dumped into this subaqueous pit. A hydraulic dredge could then have removed the material from the pit and constructed the confining dike hydraulically.

This concept was rejected primarily due to the substantial increase in cost in both fill material and dredging time. The material would still have

been hauled by truck and the movement by barge and subsequent placement by hydarulic dredge would have compounded the transport aspect of the construction activity. Although this method eliminated the need for a total land-based operation and would have been more socially acceptable from the viewpoint of adjacent landowners, it would have obliterated more open-water view than any of the other concepts studied.

BENEFITS OF THE RESEARCH AS PROPOSED

The importance of wetland areas has in recent years become well documented. Studies by Teal (1962), Matthiessen (1962) and more recently Nixon and Oviatt (1973) and Gosselink, Odum and Pope (1973) point out the value of the salt-marsh not only as nursery grounds but also as an energy source necessary for support of the estuarine biota.

Gosselink et al. (1973) have summarized leading marsh researchers as follows:

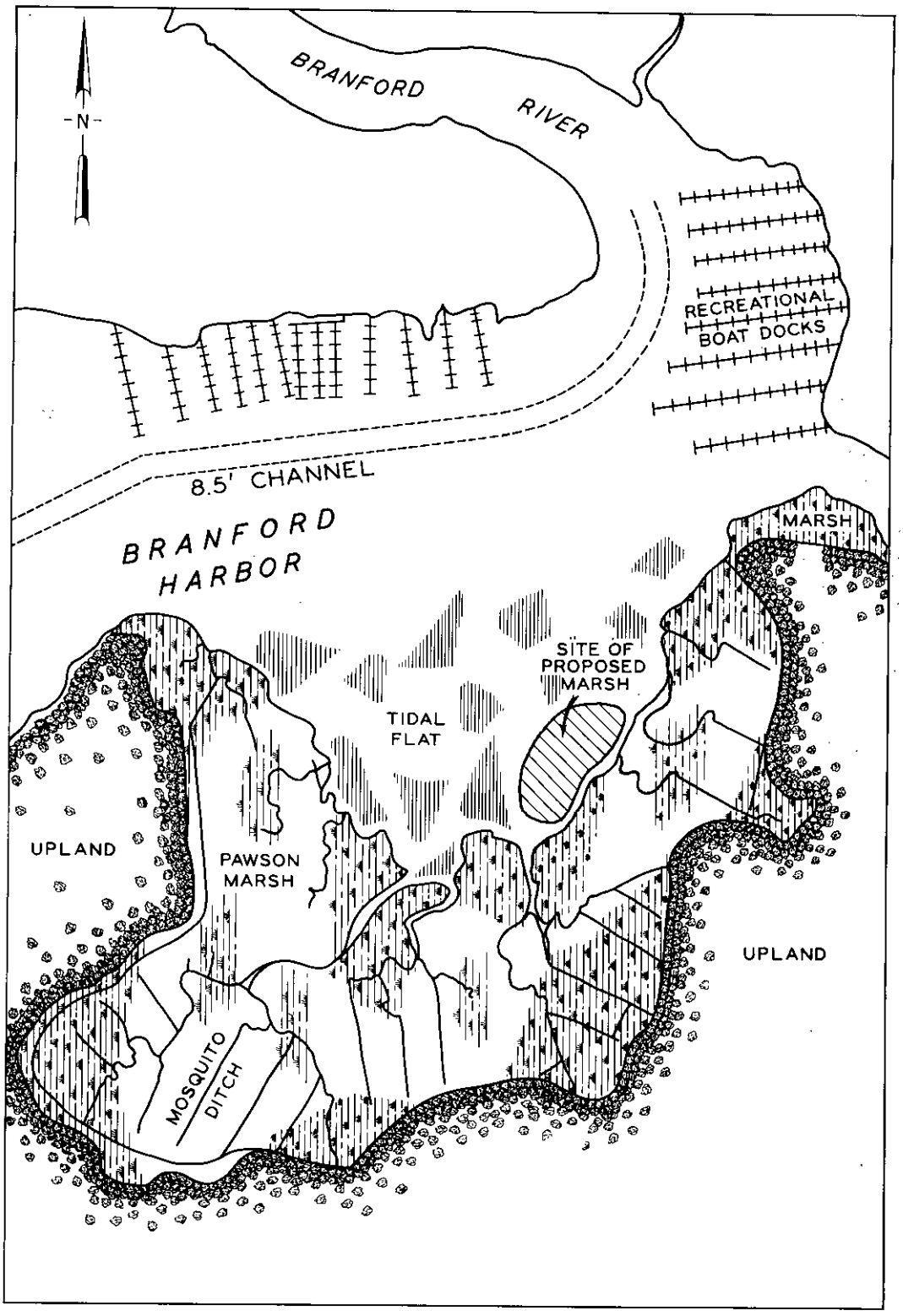
> "Tidal marshes are lands which are particularly vulnerable to capricious development (W.E. Odum 1970) because many of the real values of marshes are not recognized, or accrue some distance from the marsh itself. Teal (1962) estimated that 45 percent of the net primary production of Georgia Spartina alterniflora marsh was flushed into adjacent bays by tidal action. Odum and de la Cruse (1967) estimated that the net export of organic matter (which includes many mineral nutrients) from 25 hectares (62 acres) of such marsh was 40 kgms (88 lbs.) and 140 kgms (308 lbs.) on a neap and spring tidal cycle, respectively. Stowe et al., (1971) have estimated that well over one-half of the total production of organic matter in Gulf Coast estuaries originates from the surrounding marshes. In this way coastal marshes and other shallow water production areas (reefs, seaweed and sea grass beds, etc.) all over the world export mineral and organic nutrients that support much of the production of the adjacent estuarine and coastal waters (Odum, 1971). Furthermore, as is well-documented, estuaries serve as a nursery ground for commercially important coastal fish and shellfish. McHugh (1966) estimates that two-thirds of the cash value of species harvested on the Atlantic and Gulf Coasts are 'estuarine dependent'. Thus, productive marshes are an integral part of the estuarine system, which not only exports nutrients but also grows sea food that may be harvested in adjacent waters. Nursery ground is not the only valuable function of an undisturbed marsh, but it is an important, and now generally recognized one. Even though the marsh may be privately owned the production of that marsh does not, at present, accrue directly to the owner, but to a commercial fishery, perhaps many miles away."

While the study area would not have produced marshland of a size significant to residents of Connecticut, it would have produced guidelines on a method of dredged material disposal that may one day make the difference between dredging and not dredging a harbor. It also was to show one possible means of reversing the historic loss of coastal wetlands in Connecticut, which has been placed at 50% since 1914.

Benefits to the citizens of Branford included: 1) an additional disposal site, allowing dredging to authorized project depth; 2) additional marsh acreage with its associated benefits to the estuary; and 3) an opportunity to observe, from the beginning, development of a productive salt marsh habitat.

Particular research benefits that were expected to accrue included answers to the following questions: 1) what new construction techniques are needed for work in soft sediments? 2) what sediment consolidation and settling rates can be expected? 3) are modifications to standard dredging techniques needed for intertidal deposition? 4) what role do benthic organisms play in stabilization of sediments? 5) how and at what rate does faunal colonization of a new marsh occur? 6) how do productivities of a new and established marsh compare? 7) can productivity of marsh lands and tidal flats be compared? 8) what vegetation establishment techniques and aids are best on new sediments? and 9) what impacts on water chemistry, hydraulic factors, etc. can be expected?

The primary benefit of the project lay in the knowledge that would have been gained regarding salt marsh development as an alternative method of dredged material disposal. Granted the necessity of dredging to maintain navigable waterways and the necessity of finding environmentally acceptable methods of disposal, ramifications of the Branford Harbor marsh development project would have gone far beyond the immediate short-term impacts of the project. It is believed that marsh development can provide a method of disposal competitive in feasibility and cost to both land-based and open-water disposal, but this belief must be verified.

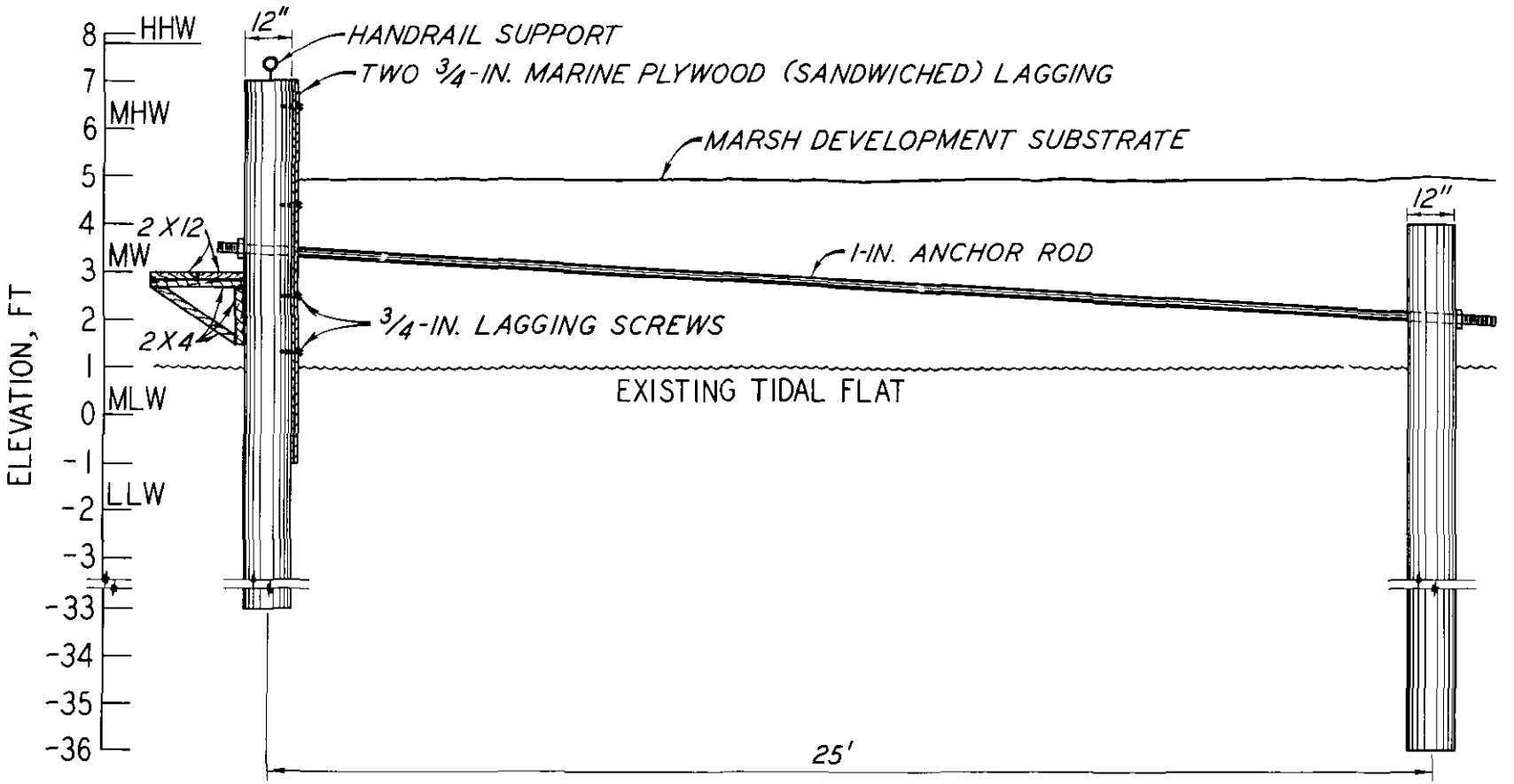


BRANFORD HARBOR, CT.

PROPOSED MARSH DEVELOPMENT SITE

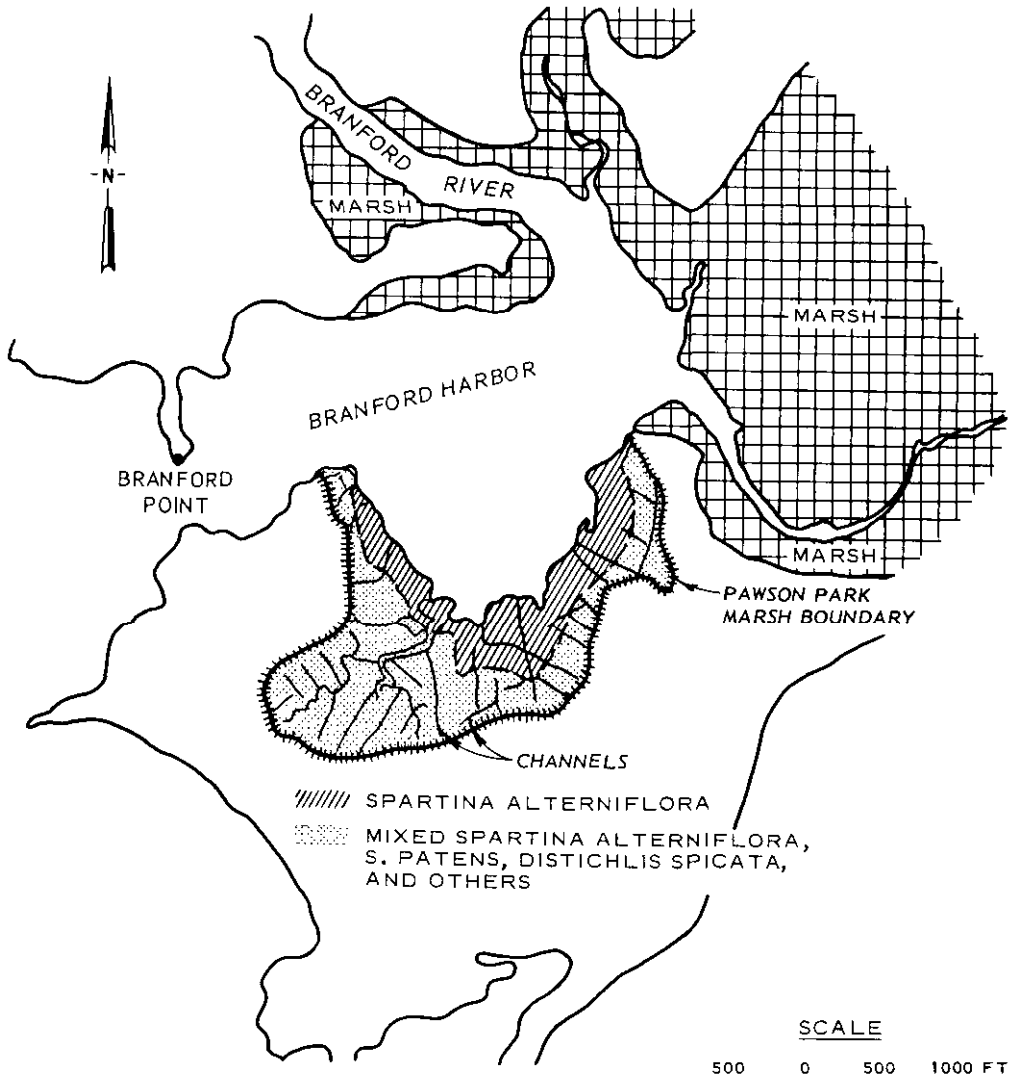
(Not to Scale)

FIG. 3



PROPOSED PROFILE OF RETAINING WALL

FIGURE 4



NOTE: UPLAND EDGE (⟿) SPECIES INCLUDE PHRAGMITES COMMUNIS, QUERCUS SPP, AND JUNIPERUS VIRGINIANA.

VEGETATION TYPE MAP
PAWSON PARK MARSH
BRANFORD, CT

FIGURE 5

APPENDIX B

SOIL DESCRIPTION

APPENDIX B

(Hill and Shearin, 1970)

WESTBROOK SERIES
(Tentative series for identification)

The Westbrook series is a member of the loamy, sulfureous (?), euic, mesic family of Terric Medifibrists. These soils are characterized by dark colored, fibric material high in salts underlain by loamy mineral sediments at 20 to 50 inches deep. The underlying mineral sediments contain 65-80 per cent silt and 15 to 18 per cent clay. Organic fibers are mostly herbaceous.

Typifying Pedon: Westbrook peat-salt water tidal marsh (Colors are for moist soil unless otherwise noted).

Oil -0-10" - Very dark gray (10YR 3/1), dark gray (10 YR 4/1), dry; about 80 per cent fiber, 65 per cent rubbed; dense mat of roots, stems and leaves; massive: slightly sticky; many large and fine roots; sodium pyrophosphate extract color light gray (10 YR 7/1); fibers herbaceous; thin lenses and coatings of silt especially noticeable when dry; 45 per cent organic matter; pH in water, initial 6.5, dried 18 days 5.3; total salts 37,440 ppm; clear wavy boundary.

Oi2 -10-40" - Very dark gray (10 YR 3/1), dark gray (10 YR 4/1), dry; about 70 per cent fiber, 50 per cent rubbed; massive; slightly sticky, few large to fine roots in the upper part; sodium pyrophosphate extract color light gray (10 YR 7/1): fibers

herbaceous; thin lenses and coatings of silt; 44 per cent organic matter; pH in water, initial 5.7, dried 18 days 4.5; total salts 22,100 ppm; gradual wavy boundary.

Oi3 -40-48" - Dark olive gray (5Y 3/2), dark gray (10 YR 4/1), dry; about 60 per cent fibers, 50 per cent rubbed; massive; slightly sticky; no roots, sodium pyrophosphate extract color light gray (10 YR 7/1); fibers herbaceous; 24 per cent organic matter; pH in water, initial 6.7, dried 18 days 4.8; total salts 23,400 ppm; clear wavy boundary.

HC1 -48-64" - Very dark gray (5Y 3/1), gray (10 YR 4/1) dry, silt loam; about 5 per cent fibers, 1 per cent rubbed; massive; slightly sticky; no roots; 12 per cent organic matter; pH in water, initial 6.6, dried 18 days 4.9; total salts 18,200 ppm; diffuse boundary.

HC2 -64-192" - Dark Gray (N4/), gray (10 YR 4/1) dry, silt loam; massive; slightly sticky; no roots; 10 per cent organic matter, few small shell fragments; pH in water, initial 6.5; total salts 20,100 ppm.

Type Location: Town of Westbrook, Middlesex County, Connecticut north of West Beach, 1,375 feet northeast of the mouth of Patchogue River and 550 feet north of Long Island Sound.

Range in Characteristics: The organic layers range from 20 to 50 inches thick. This corresponds to the depth of the underlying silt loam sediments. Sandy material lies under the silty sediments ranging from 5 to more than 25 feet deep and represents the glacial till or outwash on which the marsh deposits lie. In many places a thin layer of black sedge peat separates the silt loam sediments from the underlying sandy material. Estimated fiber content in the surface tier is 75 to 80 per cent and in the subsurface and bottom tiers from 50 to 75 per cent. After rubbing, the fiber content ranges from 10 to 25 per cent less than in the unrubbed condition. The fibers are herbaceous. Organic matter content (loss on ignition) generally decreases with depth and ranges from 65 to 45 per cent in the surface tiers to 45 to 20 per cent in the subsurface and bottom tiers. In the underlying silt loam the organic matter content ranges from 20 to 8 per cent. Initial pH values (in water) in the control section and upper mineral layers generally range from medium acid to neutral. After drying for 18 days, pH values range from 0.5 to 2.0 units lower in the Oi horizons and from 0.5 to 3.0 units lower in the HC horizons. In cuts exposed for longer periods, pH values in water generally drop to less than 3.5. Pale yellow sulphur compounds are common on exposed surfaces after prolonged drying. Total salts in the organic layers and upper mineral layers generally range between 10,000 and 30,000 ppm, although the ppm in the surface layer may exceed the salt content of sea water. Moist colors in the organic layers are mainly of 10 YR hue but range to 5Y, with values of 2 through 4 and chromas of 1 or 2. Dry colors are of the same hues with values of 4 through 6 and chromas of 1 or 2. In a few pedons, some fibers are one unit of value and one unit of chroma higher than in the matrix. Pressed moist colors are generally the same as unpressed colors but in some layers pressed color is one unit of value higher than unpressed.

Lenses and patches of dominantly gray (10 YR 6/1) silt are common in the organic layers, and are especially noticeable after drying. Moist colors in the contrasting mineral layers are in N 2/ through N 4/ or are in 10 YR or 5Y hues, with values of 2 through 4 and chromas of 1. Dry colors are in these same 10YR or 5Y hues with values of 4 through 7 and chromas of 1. Texture is silt loam, with silt ranging from about 60 to 80 per cent and clay from 10 to 25 per cent.

Competing Series and their Differentiae: The Westbrook series is the only known series in this family. The Pawcatuck series is also located in tidal marshes, but it is underlain by sandy materials ranging from 24 to 48 inches deep.

Setting: Westbrook soils are on nearly level tidal flats bordering Long Island Sound and Block Island Sound and extending inland for short distances along the banks of the larger rivers. The soils are perpetually wet and flood twice daily. The regolith consists of partially decomposed fibric organic material from salt-tolerant herbaceous plants over mineral sediments high in silt at 20 to 50 inches. The climate is cool temperate. Mean annual temperature is 48°F to 50°F, and rainfall about 45 inches.

Principal Associated Soils: These include the competing Pawcatuck soils on salt water tidal flats underlain by sandy material at 24 to 48 inches, and unnamed estuarine organic soils along the banks of rivers extending inland from Long Island Sound or Block Island Sound. Fresh water carried by the rivers dilutes the sea water and the salt content of the unnamed estuarine organic soils is less than 10,000 ppm. Many mineral soils are on adjoining uplands and terraces along the margins of the tidal flats.

Drainage and Permeability: Very poorly drained. Surface runoff is very slow. Water table at low tide is within 6 to 10 inches of the surface. If diked and drained, permeability would probably be rapid to moderately rapid in the organic layers.

Distribution and Extent: Connecticut, Rhode Island, and probably the states to the nor and south. The series is probably of moderate extent. Series Proposed: Middlesex County, Connecticut, 1969

Remarks: In mapping, these soils were formerly called Tidal marsh, undifferentiated - a miscellaneous land type. Other related Histosols, although not competing, include the Adrian, Carbondale, Carlisle, Cathro, Chippeny, Dawson, Edwards, Greenwood, Houghton, Lupton, Markey, Palms, Rifle, Tawas, and Willette series. The Adrian, Cathro, Dawson, Markey, Palms, Tawas and Willette have mineral soil material within 51 inches, but they are not developed in salt marshes and the organic material is not fibric. Chippeny soils are underlain by bedrock and Edwards by mark within 51 inches deep. Carbondale, Carlisle, Greenwood, Houghton, Lupton and Rifle soils developed in sapric or hemic deposits deeper than 51 inches. The values indicated in the typifying pedon for pH, dried 18 days, organic matter content, and total salts are from laboratory data. The drop indicated for pH values after drying, range in organic matter content and total salts discussed under the Range in Characteristics are based on data from nine pedons.

APPENDIX C

WATER QUALITY

Water Quality. Branford Harbor is classified as Bs from Lake Gaillard Dam to tidewater and SB from tidewater to the shellfish closure line. Beyond that the Long Island Sound is classified as SA. (Map page C-5).

Water quality criteria are generally based on use. Five general categories are recognized: (1) recreation and aesthetics; (2) public water supplies; (3) fish, other aquatic life, and wildlife; (4) agriculture; and (5) industry. Each category is recognized on the basis of certain water quality parameters. These include: 1) dissolved oxygen; 2) sludge deposits, solid refuse, floating solids, oil, grease and scum; 3) color and turbidity; 4) coliform bacteria; 5) taste and odor; 6) pH; and 7) allowable temperature increase. Determination of numerical values for these parameters is based on scientific investigations from individuals in a wide range of fields (Federal Water Pollution Controls Administration 1968, Cooper 1967).

Riley (1972) reported O_2 concentration in Branford Harbor for the months of June and July. Oxygen concentrations for July 22 and 29 were recorded at slightly below saturation. August data is lacking but it would be expected to find this condition persisting until water temperatures decline in September. The importance of oxygen in the water column has been discussed by Brett (1958), Fry (1957), Doudoroff & Shumway (1967) and others. Oxygen depletion results from animal respiration and organic loads such as decomposing plant and animal tissues. Replenishment occurs through diffusion from the atmosphere and photosynthysis. Except for late summer, it appears that oxygen concentration in Branford Harbor is at saturation levels.

Another important water quality parameter frequently discussed is turbidity. Turbidity is an expression of light attenuation in the water column. Many factors contribute to turbidity. Suspended organic and inorganic matter along with dissolved substances and the physical properties of the water itself all contribute to light attenuation. Turbidity has been expressed as Jackson Turbidity Units (JTU) or Formazin Turbidity Units (FTU) (Standard Methods 1971).

Another way to express turbidity is by visibility (i.e. the depth at which a standard size and colored Secchi disk is no longer discernable). Atkins and Pool (1930) have shown that the level of light intensity at which this occurs is approximately 16% of the incident light. Furthermore they have shown as a rough approximation that K=1.7/D where K is the extinction coefficient and D the Secchi disk depth in meters. Ryther (1966) defines the extinction coefficient (K) as "the natural logarithm of the fraction of incident light penetrating to a given depth. Conventionally, K is expressed as light extinction per meter depth." Ruttner (1966) offers the following formula $I = I_o \cdot E^{-eh}$ where e is the extinction coefficient, E is the base of natural logarithms, I_o is incident light, h is depth (usually 1 meter) and I is light intensity at depth h (can be expressed as percentage of incident light I_o). To the marine biologist this measurement as defined is probably more meaningful than any other measurement regarding light attenuation in the ocean. The extinction coefficient can indirectly express the percentage of light transmittance. McCarthy, Pyle and Griffin (1974) have attempted to equate percentage transmittance as measured with a Hydro Products Model 612 Transmissometer to Formazin Turbidity Units, (Standard Methods 1971 pp 351-352). Using a .1 meter cell path, percentage

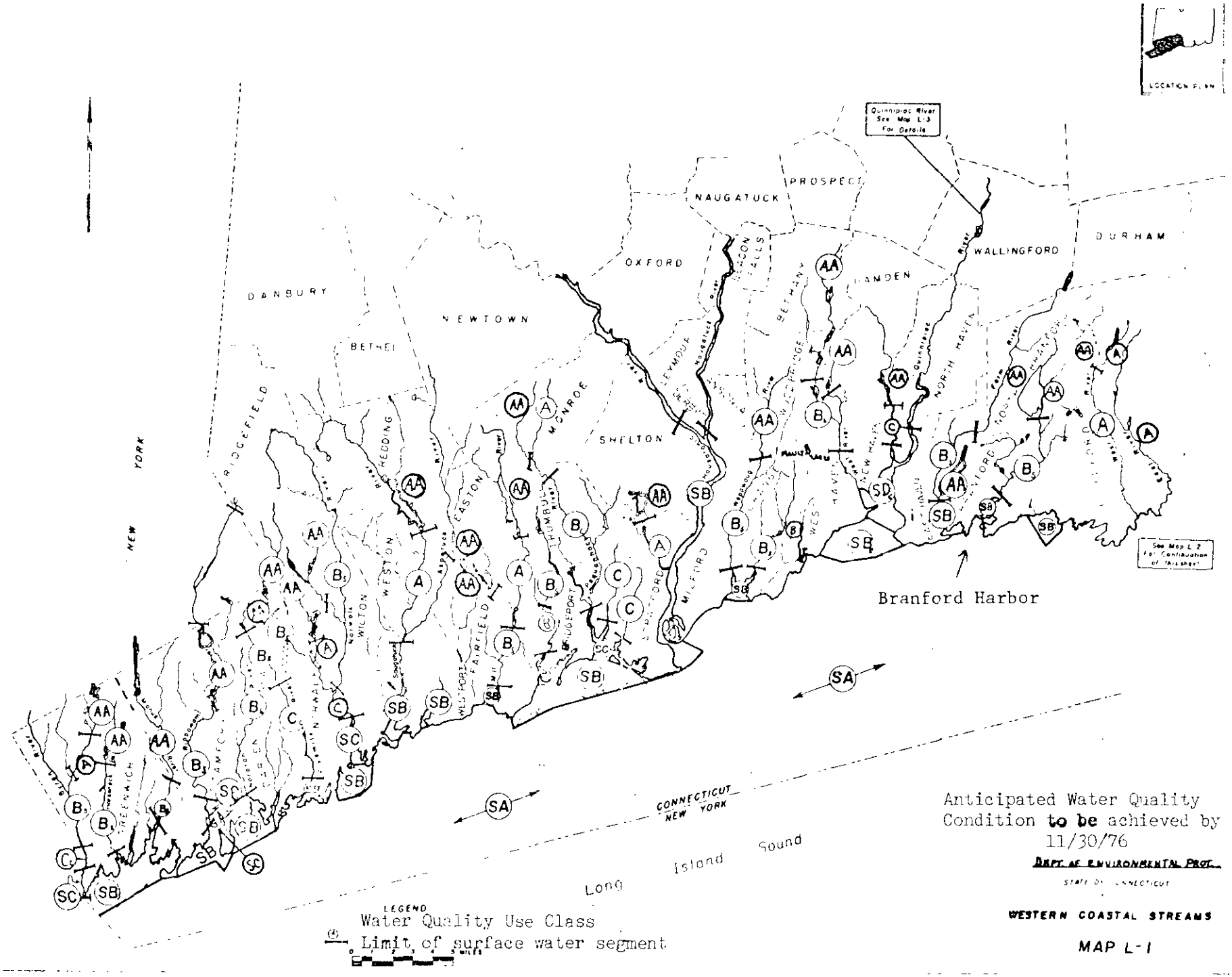
transmittance in the range of 10% to 80% could be related to 50 to 5 FTU. Measurements taken in Branford Harbor on December 12, 1974 using this same instrument recorded visibilities of less than a meter throughout the river. A slight variation was noted in which the upper reaches of the river were slightly more turbid than the lower. Recordings using a .1 meter cell path, could be related to approximately ten FTU. This represents an extinction coefficient of about 5.40. Another way to interpret this data is to realize that only 58% of the incident light at the surface penetrates to a depth of one tenth meter or that only .45% penetrates to a depth of one meter. Secchi disk readings of 2.2 m were reported by the Connecticut Department of Environmental Protection on 8/9/74 for Branford at their sample station number 28 near the Mermaids. Bohlen and Tramontano (1974) reported a seasonal variability of Secchi disk measurements ranging between 1.3 and 4.2 m for Long Island Sound waters offshore but adjacent to Branford Harbor. Suspended material concentrations were found to be weakly correlated to extinction coefficients. This indicated that dissolved compounds may exert a significant influence on total light extinction in Long Island Sound Waters.

The turbidity in Branford Harbor is high. Underwater photos were precluded by this extreme condition on Dec. 12, 1974. In fact divers would lose sight of each other when apart only two to three feet.

Based on sanitary conditions Branford Harbor is closed to the harvesting of shellfish, (letter 12/18/74 State Dept. of Health). Regulations regarding shellfish are found in the National Shellfish Sanitation

Program Manual of Operations 1965, edited by Leroy S. Houser. This is a 3 part manual published by the U.S. Dept. of Health Education and Welfare.

Table 1 lists heavy metal analysis on four water samples taken December 13, 1974 in Branford Harbor. Sample locations can be seen on map (page C-14). For comparative purposes concentrations found in seawater and concentrations having toxic effects are also listed.



LEGEND
Water Quality Use Class
Limit of surface water segment

Anticipated Water Quality Condition to be achieved by 11/30/76

DEPT. OF ENVIRONMENTAL PROT.
STATE OF CONNECTICUT

WESTERN COASTAL STREAMS

MAP L-1

TABLE I

BRANFORD HARBOR, CONN.

Sample No.	Lab Serial No.	Total Mercury ug/l	Total Copper ug/l	Total Lead ug/l	Total Zinc ug/l	Total Arsenic ug/l	Total Cadmium ug/l	Total Chromium ug/l	Total Nickel ug/l	Total Vanedium ug/l	Salinity ppm
1	100-178-1	0.0	27	4	12.5	4	1.0	< 5	5	< 8	22,000
2	100-178-2	1.0	13	< 4	9.5	5	1.0	< 5	5	< 8	24,000
3	100-178-3	2.3	22	8	25.0	3	1.5	< 5	8	< 8	13,000
4	100-178-4	0.3	19	4	21.0	5	1.0	< 5	8	< 8	9,000
	Average concentrations found in seawater[1]	.03	2	.05	12.3	4	.113	.3	5.4	2.5	
	Concentrations having toxic effects on marine life[2]	100	100	100	10,000	2,000	10-10,000	1,000	100		

FOOTNOTE 1 Handbook of Marine Science V.11
F. G. Walton Smith Ed.
CRC Press 1974

FOOTNOTE 2 Long Island Sound Regional Study
Ecological Studies an Interim Report
February 1974

WATER QUALITY STANDARDS

Department of Environmental Protection

State Office Building

Hartford, Connecticut

1974

Pursuant to the provisions of Section 25-54e of the 1971 Noncumulative Supplement to the General Statutes of Connecticut, notice was published in the Connecticut Law Journal on January 22, 1974 that the Commissioner of Environmental Protection amended, on November 30, 1973 Water Quality Standards for the surface waters of the State of Connecticut and that, under the Federal Water Pollution Control Act, the Regional Administrator of the U. S. Environmental Protection Agency approved said amendments in their entirety on December 19, 1973.

In accordance with State law, Connecticut's Water Quality Standards were initially adopted on November 17, 1969 by the Water Resources Commission, approved by the U. S. Secretary of Interior on April 21, 1970 and notice thereof published in the Connecticut Law Journal on May 26, 1970.

INLAND WATERS

CLASS B

Suitable for bathing, other recreational purposes, agricultural uses, certain industrial processes and cooling; excellent fish and wildlife habitat; good aesthetic value.

1. Dissolved oxygen	75% saturation, 16 hours/day; 5 mg/l at any time
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity provided all reasonable controls are used.
4. Color and turbidity	Turbidity shall not exceed 25 JTU, B_c 10 JTU. A secchi disk shall be visible at a minimum depth of 1 meter, B_B-criteria may be exceeded.
5. Coliform bacteria per 100 ml	Not to exceed a median of 1000 nor more than 2400 in more than 20% of samples collected.
6. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste and odor in edible fish.
7. pH	6.5 - 8.0
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85°F, or in any case raise the normal temperature of the receiving water more than 4°F. B_s -

CLASS B (CONT.)

	same as A.
9. Chemical constituents	
(a) Phosphorus	No point source discharge which will raise phosphorus concentration of the receiving waters to an amount in excess of 0.03 mg/1.

The use of subscript "s" in Class B is to identify areas suitable for cold water fisheries including fish spawning and growth.

COASTAL AND MARINE WATERS

CLASS SA

Suitable for all seawater uses including shellfish harvesting for direct human consumption (approved shellfish areas), bathing, and other water contact sports, may be subject to absolute restrictions on the discharge of pollutants; authorization of new discharges other than cooling or clean water may require revision of the class to Class SB (See General Policy 5) which would be considered concurrently with the issuance of a permit at public hearing.

1. Dissolved oxygen	Not less than 6.0 mg/l at any time.
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None allowable
3. Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity provided all reasonable controls are used.
4. Color and turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity provided all reasonable controls are used. A secchi disc shall be visible at a minimum depth of 1 meter, SA_B - criteria may be exceeded.
5. Coliform bacteria per 100 ml	Not to exceed a median MPN of 70 and not more than 10% of the samples shall ordinarily exceed an MPN of 230 for a 5-tube decimal dilution of 330 for a 3-tube decimal dilution.
6. Taste and odor	None allowable
7. pH	6.8 - 8.5

CLASS SA (CONT.)

8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August, September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
9. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses.

CLASS SB

Suitable for bathing, other recreational purposes, industrial cooling and shellfish harvesting for human consumption after depuration; excellent fish and wildlife habitat; good aesthetic value.

1. Dissolved oxygen	Not less than 5.0 mg/l at any time.
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3. Sand or silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity provided all reasonable controls are used.
4. Color and turbidity	A secchi disc shall be visible at a minimum of 1 meter SB_B - criteria may be exceeded.
5. Coliform bacteria per 100 ml	Not to exceed a median value of 700 and not more than 2300 in more than 10% of the samples.
6. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
7. pH	6.8 - 8.5
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July,

	August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
9. Chemical consitutents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this class.

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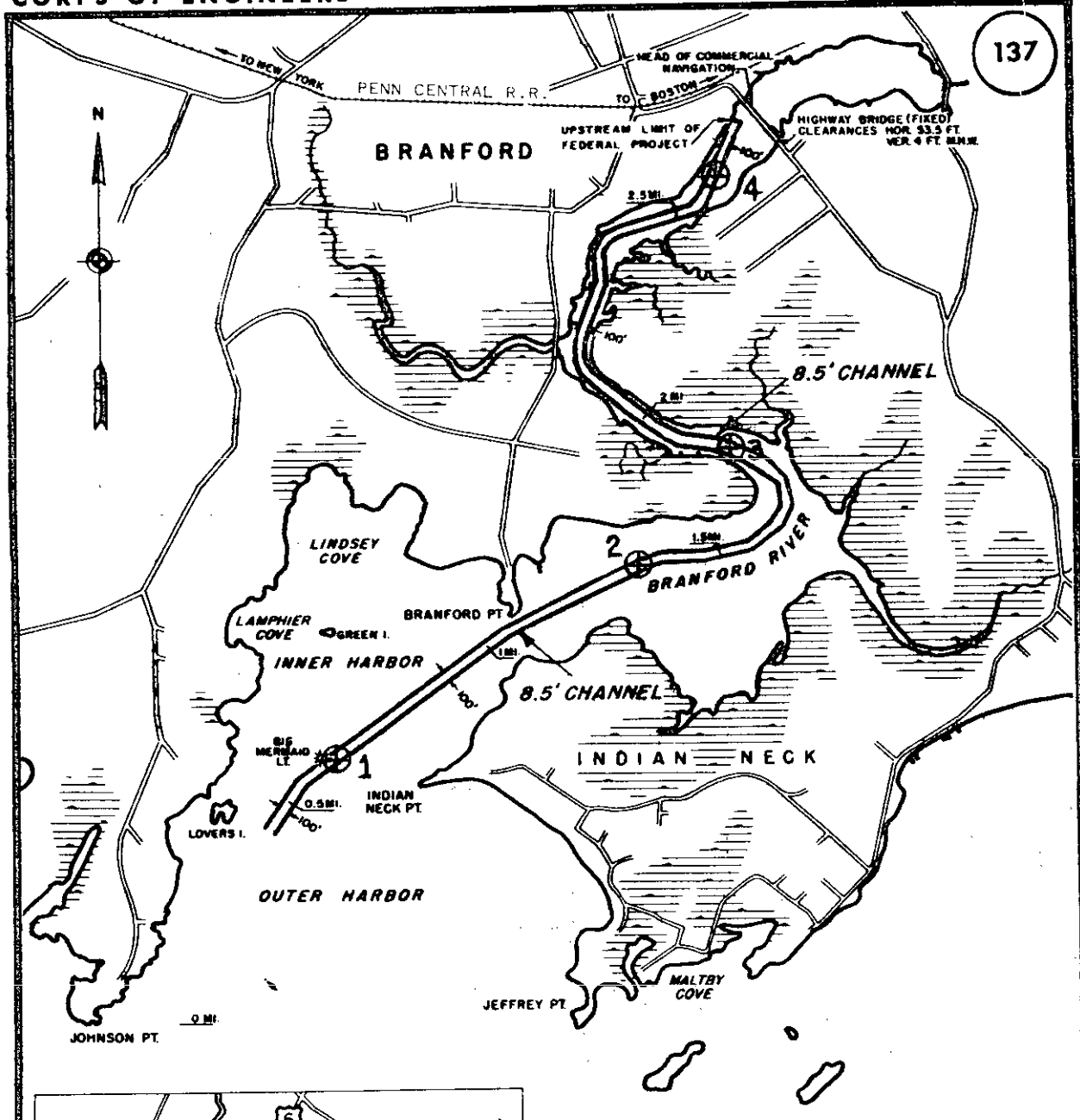
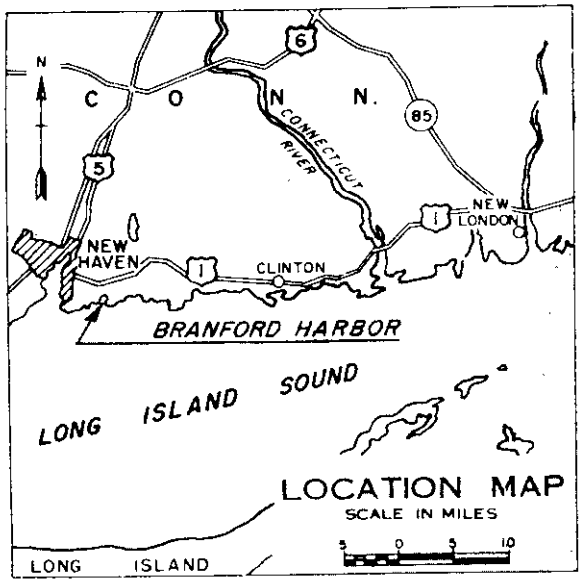




⊕ WATER SAMPLE STATIONS

BRANFORD HARBOR
CONNECTICUT

30 JUNE 1973

IN 1 SHEET

1000 0 1000 2000 FT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

APPENDIX D

PLANTS IN THE BRANFORD AREA

List of Plant Species Identified from Specific Sites Around Branford Harbor
24-25 November 1974*

A. Pawson Marsh

1. Marsh Plants

COMMON	SCIENTIFIC
Glasswort	Salicornia europea L.
	Juncus secundus Beauv. ex. Pori.
Marsh-elder	Iva frutescens L.
Salt meadow hay	Spartina patens (Ait.) Muhl.
Spikegrass	Distichlis spicata (L.) Green
Sea lavender	Limonium carolinianum
Salt marsh cordgrass	Spartina alterniflora Loisel

2. Edge and Upland Plants

Beech	Fagus grandifolia Ehrh.
Birch	Betula papyrifera Marsh.
Bittersweet	Solanum dulcamara L.
Reedgrass	Phragmites communis Trin.
Common yarrow	Achillea millefolium L.
Dandelion	Taraxacum officinale Wiggers
Hop hornbean	Ostrya virginiana (Miller) K. Koch
Multiflora rose	Rosa multiflora Thunb.
Northern red oak	Quercus borealis
Privet	Ligustrum vulgare L.

* Plant collections and identification by Dr. Donald G. Rhodes, Louisiana Tech University, Ruston, Louisiana.

2. Edge and Upland Plants (cont.)

COMMON	SCIENTIFIC
	Prunus spp.
	Pyrus sp.
Red cedar	Juniperus virginiana L.
Salt marsh aster	Aster tenuifolius
Salt marsh goldenrod	Solidago sempervirens L.
Sand-spurrey	Spergularia marina (L.) Griseb.
Sassafrass	Sassafras albidum (L.) Karst.
Scarlet oak	Quercus coccinea Muenchh.
Scrub pine	Pinus virginiana Mill.
Silverberry	Eleagnus umbellata Thunberg.
Staff-tree	Celastrus scandens L.
Staghorn sumac	Rhus typhina L.
Sugarberry	Celtis occidentalis L.
	Ulmus spp.
	Vaccinium spp.
White oak	Quercus alba L.
Wild ryegrass	Elymus virginicus L.

3. Disposal Site A

Reedgrass	P. communis
Glasswort	S. europaea
Marsh-elder	I. frutescens
Salt meadow hay	S. patens

3. Disposal Site A (cont.)

COMMON	SCIENTIFIC
Plantain	P. maritima
Spikegrass	D. spicata
Salt marsh aster	A. tenuifolius
Sand-spurrey	S. marina
Sea lavender	L. carolinianum
Salt marsh cordgrass	S. alterniflora

4. Disposal Site B

Birch	B. papyrifera
Bittersweet	S. dulcamara
Brambles	Rubus spp.
Broom-sedge	Andropogon virginicus L.
Bull thistle	Cirsium vulgare (Savi) Tenore
Climbing buckwheat	Polygonum scandens L.
Reedgrass	P. communis
Cottonwood	Papulus deltoides Marsh.
Dropseed	Sporoblous spp.
Glasswort	S. europea
Greenbriar	Smilax glauca Walt.
Japanese honeysuckle	L. japonica
Little bluestem	Andropogon scoparius Michx.
Marsh-elder	I. frutescens
Salt meadow hay	S. patens
Orach	Atriplex patula L.

4. Disposal Site B (cont.)

COMMON	SCIENTIFIC
Pepper weed	Lepidium virginicum L.
Pokeweed	P. americana
Primrose	Oenothera spp.
	Prunus spp.
Rabbit-tobacco	Gnaphalium obtusifolium L.
	Rosa spp.
Staghorn sumac	R. typhina
Spikegrass	D. spicata
Salt marsh aster	A. tenuifolius
Salt marsh goldenrod	S. sempervirens
Salt marsh cordgrass	S. alterniflora
Vervain	Verbena spp.
Wild carrot	Daucus carota L.
Wild ryegrass	E. virginicus

APPENDIX E

PLANKTON

Branford Harbor is sample station #28 for the Connecticut Department of Environmental Protection Biological monitoring program. This sampling program, in addition to plankton, included periphyton, macrophyton, macroinvertebrates, and fish. Date of sampling was 8/9/74, water temperature was 20° C, average depth was 3.2m, and no thermal stratification was observed. Sample location is depicted on the map. (Page E-4). The compiled list follows:

1. Plankton	Relative Abundance %
(a) Phytoplankton	
CYANOPHYCEAE	
Non-filamentous blue-green algae	
Anacystis	21.3
CHLOROPHYCEAE	
Non-filamentous green algae	
Actinastrum	2.3
Closteriopsis	4.7
Chlorella	7.3
Filamentous green algae	
Ulothrix	4.7
BACILLARIOPHYCAEAE	
Centric diatoms	
Thalissiosira	33.5
Pennate diatoms	
Cyrosigma	4.7
Synedra	4.7
DINOPHYCEAE	
Dinoflagellates	
Peridinium	7.3
Pyrophacus	9.5

(b) Zooplankton	Relative Abundnance %
ANTHROPODA	
Nauplius larvae	54.0
OTHER INVERTEBRATA	
Rotifera	23.0
ANNELIDA	
Trochophore larvae	23.0

2. Periphyton

BACILLARIOPHYCEAE	
Pennate diatoms	
Synedra	1.2
Meridion	0.6
Thalassiothrix	0.2
Diatoma	7.7
Coccomeis	1.6
Nitzchia	1.0
Fragilaria	4.5
Achananthes	0.2
Cymbella	0.8
DINOPHYCEAE	
Dinoflagellates	
Diplosalis	0.2
PROTOZOA	
Halteria	0.2
CYANOPHYCEAE	
Non-filamentous blue-green algae	
Coccochloris	0.4

	Relative Abundance %
Filamentous blue-green algae	
Entophysalis	3.5
Oscillatoria	58.0
CHLOROPHYCEAE	
Non-filamentous green algae	
Ankistrodesmus	1.8
Fremosphaera	0.2
Chlorococcum	3.1
Filamentous green algae	
Coleochaete	2.6
BACILLIARIOPHYCEAE	
Centric diatoms	
Cyclotella	9.6
Melosira	1.2
Ceratulus	1.4

3. Macrophyton

Codium fragile

Polyides rotundus

Ulva lactuca

Fucus sp.

4. Macroinvertebrates

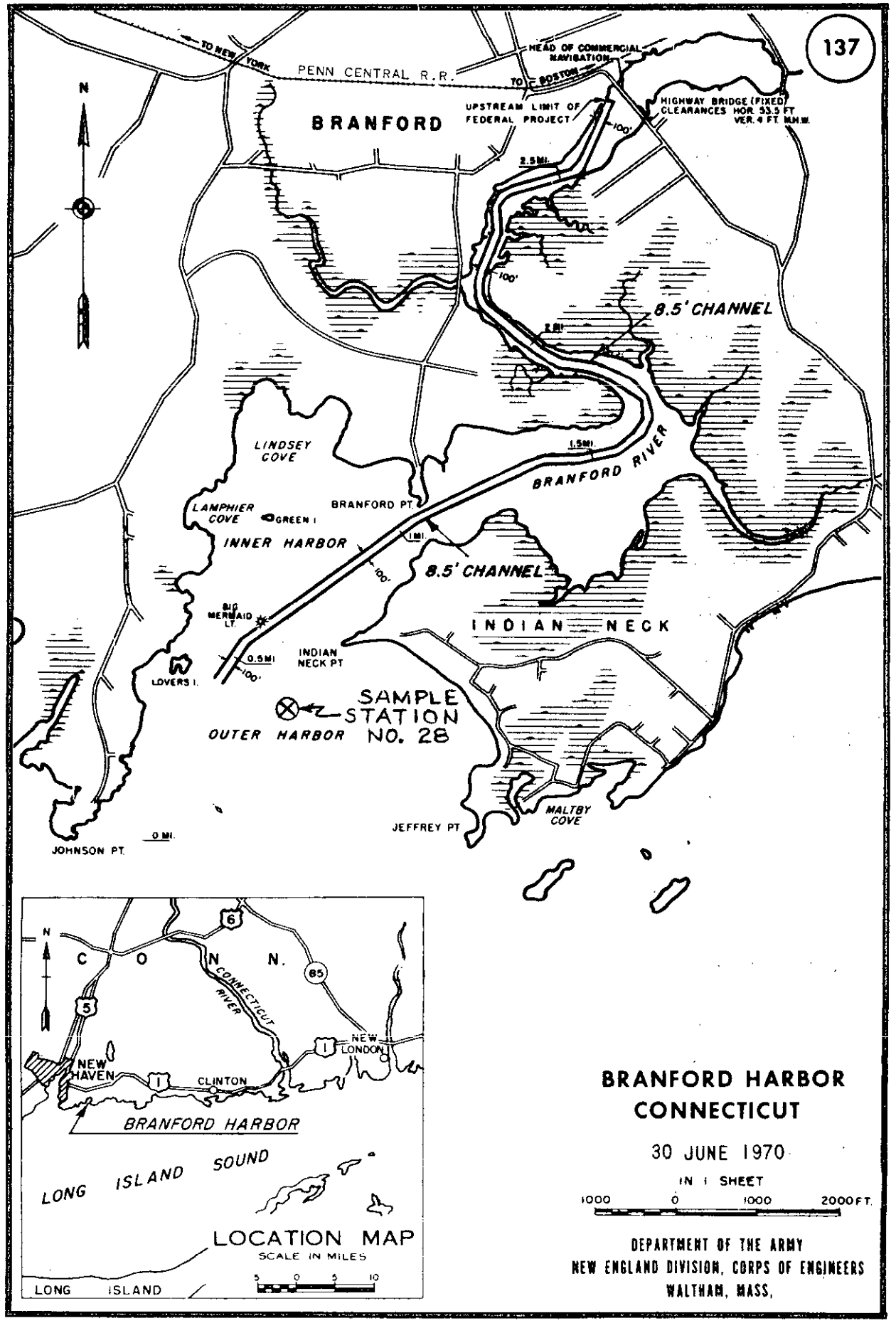
Mytilus

Balanus

Erichthonius

5. Fish

Porgy



BRANFORD HARBOR
CONNECTICUT

30 JUNE 1970

IN 1 SHEET

1000 0 1000 2000FT.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

APPENDIX F

INVERTEBRATES

INVERTEBRATES LISTED IN THE
COKE WORKS ELECTRIC GENERATING PLANT
FINAL ENVIRONMENTAL STATEMENT
NEW HAVEN HARBOR, CONNECTICUT

Bottom Invertebrates:

Coelenterata

Bouganivillea carolinensis
Metridium dianthus

Platyhelminthes

Trigonoporous folium

Nemertea

Cerebratulus lacteus

Annelida

Lepidasthenia grimaldii
Lepidonotus squamatus
Nereis arenaceodonta
N. succinea
N. virens

Arthropoda

Neomysis americana
Balanus eberneus
Cancer irroratus
Crangon septemspinosa
C. vulgaris
Homarus americanus
Neopanope texana
Palaemonetes intermedius
Limulus polyphemus

INVERTEBRATES LISTED IN THE
COKE WORKS ELECTRIC GENERATING PLANT
FINAL ENVIRONMENTAL STATEMENT
NEW HAVEN HARBOR, CONNECTICUT
(continued)

Mollusca

Callocardia morrhuana
Crassostrea virginica
Mya arenaria
Pholas costata
Spisula polynyma
Tellina agilis
Mercenaria mercenaria
Crepidula fornicata
C. plana
Littorina littorea
Nassarius obsoleta
N. bivittata
Tornatina canaliculata
Urosalpinx cinerea

Urochordata

Molgula manhattensis

INVERTEBRATES EXPECTED TO OCCUR IN BRANFORD HARBOR

Species	Habitat	Range	Abundance in New England
Arthropoda (amphipods)			
Gammarus palustris	Estuaries, mainly benthic, also under damp debris boards & stones	New Hampshire to northern Florida	Common
Orchestia grillus	Littoral	Boreal species that have been found as far south as 39° latitude	Common
Orchestia uhleri	Salt marshes and estuaries. Under debris among Spartina roots and on grass stems	Maine, Florida, Gulf of Mexico and as far south as 43° latitude, a temperate species	Common
Arthropoda (crabs & other crustaceans)			
Carcinus meanus (Green crab)	Beaches, estuaries	Maine to New Jersey	Common
Sesarma reticulatum (Marsh crab)	Burrows in salt marshes. Associated with Uca pugnax	Occurs along eastern seaboard northward to Cape Cod	Common
Uca sp. (Fiddler crab)	Burrows in the mud and sand of the saltmmarshes	Eastern Atlantic coast northward to Cape Cod	Very common
Callinectes sapidus (Blue crab)	In estuaries	Occurs from Cape Cod southward to Florida and around the Gulf of Mexico to Mississippi	Common
Balanus balanoides (Acron barnacle)	Intertidal rocks	Arctic Ocean to Delaware Bay	Abundant

Species	Habitat	Range	Abundance in New England
Mollusca (clams & snails)			
Modiolus demissus (Ribbed mussel)	Abundant on mudflats and sand spits, often exposed at low tide	Ranges from Prince Edward Island to South Carolina and Georgia	Common
Mercenaria mercenaria (Northern quahog)	Intertidal shallow on sandy or muddy bottoms	Gulf of Saint Lawrence to the Gulf of Mexico	Common
Mya arenaria (Soft shellclam)	Shallow, muddy bottoms, estuaries	Arctic seas to North Carolina	Common
Littorina saxatilis (Rough periwinkle)	Littoral	Boreal species that have been found as far south as 39° latitude	Common
Crepidula convexa (Slipper limpet)	Shallow	Between Cape Cod and the Bay of Fundy. Temperate species	Common
Nassarius obsoletus (Mud snail)	Estuaries	Atlantic seaboard	Abundant
Littorina litorea (Common periwinkle)	In estuaries	Coast of Canada, Maine and Mass. to the Long Island Sound	Common
Annelida (worms)			
Enoplobranchus sanguineus (Polychaete worm)	Readily found at the low water mark in mud and sand	Common along the eastern seaboard from the Gulf of St. Lawrence to Virginia	Common
Nereis virens (Clam worm)	Occurs under stones or burrows in the sand or mud in sheltered bays and sounds, where it is common at the low water mark	Widely distributed from south New England along the entire north-eastern coast to Labrador, continuing around through the Artic region to the northern coasts of Europe and Great Britain	Common

Species	Habitat	Range	Abundance in New England
Podarke obscura (polychaete worm)	Found in great abundance at Woods Hole, Mass. among eel-grass and swimming at the surface of Eel Pond and other quiet waters		Common
Lumbrineris spp.	Littoral to 3446 meters	Between Cape Cod and Bay of Fundy Temperate species	Common
Nereis succinea	Littoral to 46 meters euryhaline; min. salinity 16 0/00	Between Cape Cod & Bay of Fundy; temperate species	Common
Orbinia ornata	Littoral to 33 meters	Temperate species	Common
Scoloplos robustus	Littoral to 57 meters	Between Cape Cod and Bay of Fundy; temperate species	Common
Cnidaria (Sea anemones)			
Haloclava producta (Burrowing sea anemone)	Shallow, euryhaline, min. salinity given 16 0/00	Temperate species	Common
Haliplanella luciae	Littoral, eurythermal	Between Cape Cod & Bay of Fundy; temperate species	Common
Chordata			
Saccoglossus kowalewski (acorn worms)	Littoral to a few meters, euryhaline minimum salinity given 16%.	Temperature species extending north into Cape Cod Bay	Common

SOURCE

Species List from Olmstead (Personal Communication).
Data compiled by Environmental Analysis Branch, NED.

With the cooperation of Tom Hoehn from the Connecticut Department of Environmental Protection, grab samples were taken on the 13th of December 1974 in Branford Harbor. The grab used was a modified Van Veen with an area of 1/23 m^2. See map for grab sample locations (page F-10).

Grab #1. This sample consisted almost entirely of shell fragments of the bivalve Mulinia lateralis. A dry weight of 13.5 g was obtained. Rough calculations based on data from Rhodes (1973 a, b; 1974), indicate a concentration in excess of $2x10^5$ individuals per m^2. This large concentration must represent many growing seasons or a deposition area was sampled. Other animals present were:

4 Nasserius trivittatus

1 Yoldia limatula

2 Nephthys sp

15 Amphipod tubes

2 Ensis directus (shells)

Grab #2. A predominance of tube dwelling amphipods, 50-100 live:

2 Ensis directus (shells)

30 Mulinia lateralis (shells)

Oyster shell fragments

1 Nassarius trivittatus

1 Petricola pholadiformis (shell)

1 tube Pectinaria gouldii

1 polychate

Grab #3. Tube dwelling amphipod approximately 1500

1 Ensis directus

1 Nassarius trivittatus

3 Nephthys sp.

2 Polychaetes

Grab #4. Tube dwelling amphipods numbering approximately 200

50 Mulinia lateralis (shells)

2 Petricola pholadiformis

4 Ensis directus

1 Nassarius trivittatus

Grab #5. This sample was marked with a strong marine order (H_2S). In addition detritus consisting of leaf fragments was prevalent. Tube dwelling amphipods numbering about 500 dominated the sample.

1 mud crab

1 Nephthys sp.

1 Polychaete

1 Pholas sp.

1 Anomia simplex

3 Mya arenaria (shells)

Summary of Ampelisca communities Pratt (1973).

"Ampelisca Communities. One of the more distinct faunal groups found in Mid-Atlantic Bight estuarine areas is characterized by dominance of amphipod crusteceans of the genus Ampelisca. These have been well described in southern New England bays and sounds where they occur on relatively shallow sand and silt-sand bottoms, often surrounding Nephtys-Nucula communities on deeper muddy bottoms. Offshore Ampelisca communities are much less well known."

"Ampeliscids build flat tubes which extend several centimeters into the sediment and a few millimeters to a centimeter above it. The animals suspend themselves, ventral side up, in the mouths of these tubes, and feed by using their long 2nd antennae to either 'whirl' detritus off the bottom or to collect it from the sediment surface. Densities of several thousand adults or tens of thousands of juveniles per m^2 (Table 1) result in a dense mat of tubes covering the bottom."

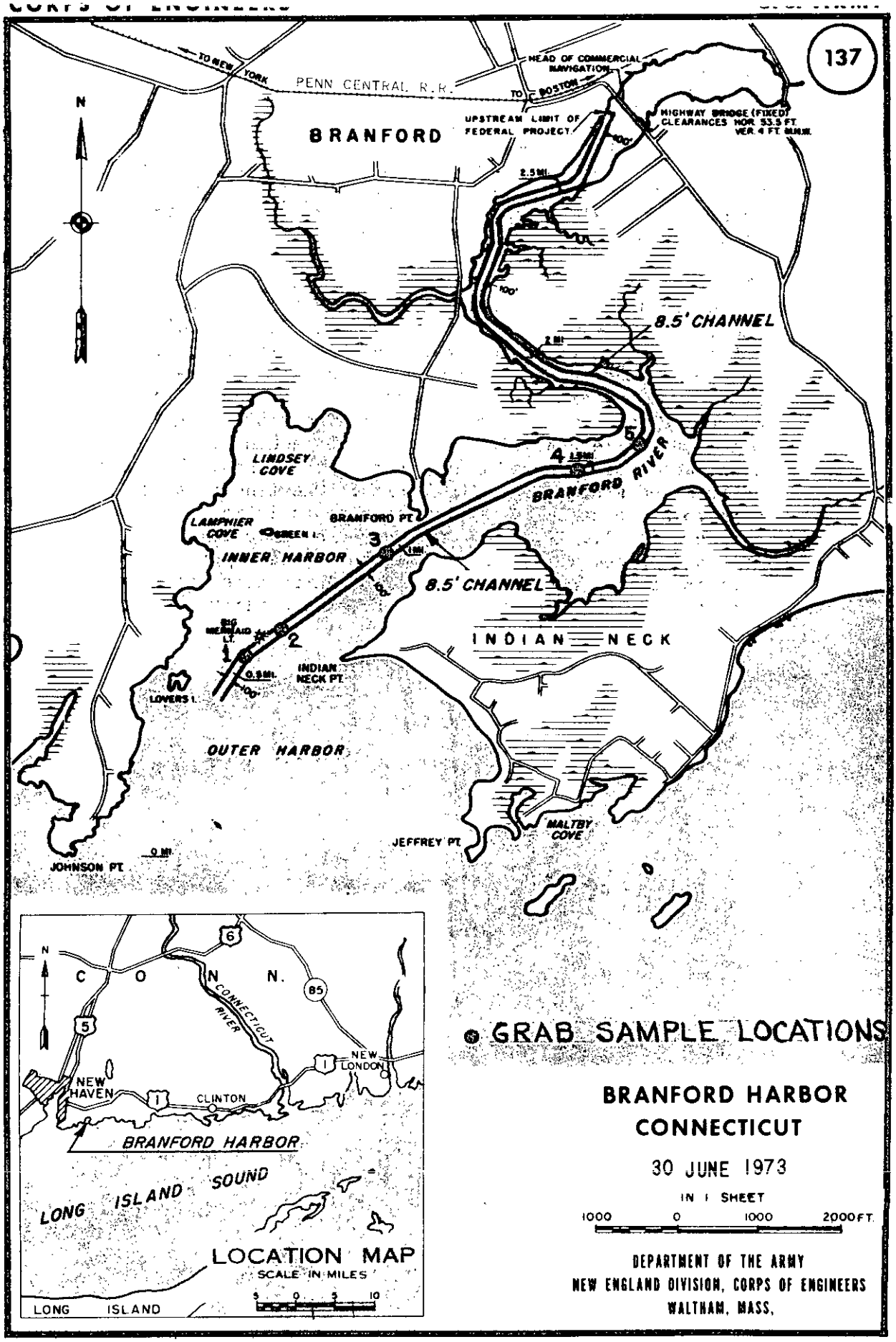
"Table 1. Maximum numbers of Ampelisca species reported from Atlantic coastal areas (density/m^2)

Barnstable Harbor	43,200	A.	abdita	(Mills, 1967b)
Buzzards Bay	31,628	A.	'spinipes'	(Sanders, 1958)
Narragansett Bay	1,070	A.	'spinipes'	(Phelps, 1958)
	9,780	A.	'spinipes'	(Stickney & Stringer, (average) 1957)
Long Island Sound	1,885	A.	abdita	(Sanders, 1956)
	1,306	A.	vadorum	(Sanders, 1956)
Great Bay, N.J.	10,000	A.	abdita	(Durrand & Nadeau, 1972)
Rhode Island	35,390	A.	agassizi	(Pratt, Unpublished)
	18,330	A.	agassizi	(Pratt, Unpublished)"

"Ampelisca communities are relatively productive in terms of species eaten by fish (mainly crustacea, polychaetes, and small bivalves). The dry weight of Ampelisca alone may be as high as 11 gm/m^2 (Sanders, 1956), but 5 g/m^2 may be a more representative value. Since Ampelisca reproduces twice a year, actual production is higher than the standing crop would indicate. Sanders estimated a productivity-standing crop ratio of 5:1.

There may be continuous recruitment of young into the fish foot size class throughout the summer. Juvenile winter flounder and scup feed extensively on Ampelisca in Long Island Sound (Richards, 1963). Adult winter flounder feed on Ampelisca in Narragansett Bay."

"The studies of Mills and Sanders on amphipod communities in southern New England only begin to provide the information necessary to understand their organization, productivity, and sensitivity to disturbance. Research is needed on the ecology of subtidal populations. Some areas of importance include succession and competition within beds, correlation with distribution of commercial bivalves, decapod feeding in beds, and resistance of colonies to both mechanical disturbance and chemical pollutants. The finding that amphipods are sensitive to hydrocarbon pollution (Sanders et al., 1972) and to general organic pollution (Pearce, 1970) suggests that the historical distribution of beds should be examined in order to detect long term trends in environmental quality."


137
TO NEW YORK
PENN CENTRAL R.R.
HEAD OF COMMERCIAL NAVIGATION
TO BOSTON
BRANFORD
UPSTREAM LIMIT OF FEDERAL PROJECT
HIGHWAY BRIDGE (FIXED) CLEARANCES HOR. 53.5 FT. VER. 4 FT. MHW
N
8.5' CHANNEL
LINDSEY COVE
BRANFORD RIVER
LAMPHIER COVE
BRANFORD PT
GREEN I.
INNER HARBOR
8.5' CHANNEL
INDIAN NECK
BIG MEADOW LT.
INDIAN NECK PT.
LOVERS I.
OUTER HARBOR
MALTBY COVE
JEFFREY PT
JOHNSON PT
0 MI
1 MI
2 MI
2.5 MI
0.5 MI
100'
1
2
3
4
5
6
8
GRAB SAMPLE LOCATIONS
BRANFORD HARBOR
CONNECTICUT
30 JUNE 1973
IN 1 SHEET
1000 0 1000 2000 FT.
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.
LOCATION MAP
SCALE IN MILES
5 0 5 10
LONG ISLAND
CONNECTICUT RIVER
NEW HAVEN
CLINTON
NEW LONDON
BRANFORD HARBOR
LONG ISLAND SOUND
6
85
5
1

APPENDIX G

FISHERY

COMMON FISHES OF LONG ISLAND SOUND

LONG ISLAND SOUND INTERIM REPORT

COMMON NAME	SCIENTIFIC NAME
Grubby	Myoxocephalus aeneus
Shorthorn sculpin	Myoxocephalus scorpius
Longhorn sculpin	Myoxocephalus octodecemspinosus
Sea raven	Hemitripterus americanus
Summer flounder	Paralichthys dentatus
Fourspot flounder	Paralichthys oblongus
Windowpane	Scophthalmus aquosus
Yellowtail flounder	Limanda ferruginea
Winter flounder	Pseudopleuronectes americanus
Hogchoker	Trinectes maculatus
Northern puffer	Sphoeroides maculatus
American eel	Anguilla rostrata
Blueback herring	Alosa aestivalis
Alewife	Alosa pseudoharengus
American shad	Alosa sapidissima
Atlantic herring	Clupea harengus harengus
Atlantic menhaden	Brevoortia tyrannus
Bay anchovy	Anchoa mitchilli
Brown trout	Salmo trutta
Rainbow smelt	Osmerus mordax
White catfish	Ictalurus catus
Oyster toadfish	Opsanus tau
Atlantic cod	Gadus morhua
Silver hake	Merluccius bilinearis
Atlantic tomcod	Microgadus tomcod
Pollock	Pollachius virens
Red hake	Urophycis chuss
Ocean pout	Macrozoarces americanus
Sheepshead minnow	Cyprinodon variegatus
Banded killifish	Fundulus diaphanus
Mummichog	Fundulus heteroclitus
Striped killifish	Fundulus majalis
Tidewater silverside	Menidia beryllina
Atlantic silverside	Menidia menidia
Northern pipefish	Syngnathus fuscus
White perch	Morone americana

COMMON FISHES OF LONG ISLAND SOUND (CONT.)

COMMON NAME	SCIENTIFIC NAME
Striped bass	Morone saxatilis
Black sea bass	Centropristes striatus
Bluefish	Pomatomus saltatrix
Scup	Stenotomus chrysops
Weakfish	Cynoscion regalis
Spot	Leiostomus xanthurus
Northern kingfish	Menticirrhus saxatilis
Tautog	Tautoga onitis
Cunner	Tautogolabrus adspersus
American sand lance	Ammodytes americanus
Atlantic mackerel	Scomber scombrus
Butterfish	Peprilus triacanthus
Northern searobin	Prionotus carolinus

This table summarizes the 49 most common species among the more than 100 finfish species known to occur in Long Island Sound.

Source: Ecological Studies, An Interim Report of the Long Island Sound Regional Study, January, 1974. New England River Basins Commission.

FISH SPECIES LISTED IN THE FINAL ENVIRONMENTAL STATEMENT
COKE WORKS ELECTRIC GENERATING PLANT
NEW HAVEN HARBOR, CONNECTICUT

Species	Habitat	Range	Abundance in New England
Microgadus tomcod (Tomcod)	Estuaries, salt water, stream mouths, brackish	North American coastal waters from the Gulf of St. Lawrence and northern Newfoundland to Virginia, running up into fresh water	Common
Urophycis chuss (Red hake)	Harbors; salt water	Exclusively American continental waters from Gulf of St. Lawrence and southern part of Grand Bank of New Foundland southward to the Middle Atlantic States	Very common
U. tenuis (White hake)	Harbors; salt water	Known off N. Caroline north to Gulf of St. Lawrence to Grand Bank of N. Foundland	Very common
Pungitius pungitius (Nine-spined stickleback)	Estuaries; hardly touch the open waters of the Gulf. Fresh and salt waters	Nova Scotia & Bay of Fundy to Cape Cod	Common
Syngnathus fuscus (Common pipefish)	Salt marshes, harbors & river mouths; salt & brackish	Coast of eastern North America from the southern side of the Gulf of St. Lawrence and Outer Nova Scotia at Halifax to S. Caroline	Abundant

Species	Habitat	Range	Abundance in New England
Morone saxatilis (Striped bass)	Strictly an in-shore fish	Atlantic coast of E. N. America from the lower St. Lawrence River and the southern side of the Gulf of the St. L. to N. Florida	Reasonably plentiful
Cynoscion regalis (Weakfish)	Shallow waters off Atlantic Coast	Eastern coast of the U. S. from the east coast of Florida to Mass Bay., straying northward to the Bay of Fundy and perhaps to Nova Scotia	Limited
Stenotomus chrysops (Scup)	Inshore from early April at Chesapeake Bay and from early May Northward to S. MA. Winter off Virginia & N. Carolina	East Coast of U. S. from N. Carolina to Cape Cod, casual in the Gulf of Maine as far as Eastport, Maine	Limited
Tautoga onitis (Tautog)	Strictly a coastwise fish	Atlantic coast of N.A. from the outer coast of Nova Scotia to S. Carolina, chiefly south of Cape Ann; most abundant between Cape Cod & the Delaware Capes	Common
Tautogolabrus adspersus (Cunner)	Coastal fish	Atlantic Coast of N.A. and the offshore banks from Conception Bay east coast of Newfoundland, and the western & southern parts of the Gulf of St. Lawrence southward in abundance to N.J. and occasionally as far as the mouth of the Chesapeake Bay	Common
Prionotus carolinus (Northern sea robin)	Smooth hard bottom less often on mud or about rocks. In-shore May or June	Coastal waters of eastern north America from the Bay of Fundy to S. Carolina; chiefly west and south from Cape Cod	Plentiful

Species	Habitat	Range	Abundance in New England
Myoxocephalus aeneus (Grubby)	From tide mark to 15 fathoms. All types of bottoms, most abundantly among eel grass	North American coastal waters from New Jersey to Northern Nova Scotia and the Gulf of St. Lawrence, both in the southern side, where it is common, and the Strait of Belle Isle	Common
Myoxocephalus octodecemspinosus (Longhorn sculpin)	Along shores, shoal harbors, and bays where it comes up on the flats at high tide. Never in fresh water.	Coastal waters of eastern North America from Eastern Newfoundland and the north shore of the Gulf of St. Lawrence, south regularly to N.J. and reported to the Atlantic Coast of Virginia	Common
Pholis gunnellus (Rock eel)	Found along low tide mark, left by the ebb in little pools of water, under stones or among seaweed awaiting the return of the tide. Down to 40 fathoms. Pebbly, gravelly, or stoney ground, or shell beds, and not mud or eelgrass	Shoal waters on both sides of the N. Atlantic from Hudson Strait to the offing of Delaware Bay on the American coast	Common
Paralichthys oblongus (Four-spotted flounder)	23 fathoms to 150 fathoms	Taken between the eastern part of Georges Bank and the coast of South Carolina. Its center of abundance appears to lie between S. New England & Delaware Bay	Plentiful

Species	Habitat	Range	Abundance in New England
Trinectes maculatus (Hogchoker)	Confined to immediate vicinity of coast. Common in bays, estuaries, where water is more or less brackish	Off the Atlantic & Gulfcoasts of N. Amer. from Mass. Bay to the Atlantic coast of Panama. Abundant in Chesapeake and to the southward, and moderately common as far north as S. New England, but it is rare north of Cape Cod	Rare
Mustelis canis (Smooth dogfish)	Shorefish and bottom swimmer, enters shoal harbors & bays, & even coming into fresh water down to depth of 80-90 fathoms	Coastal waters of the Western Atlantic, from Uruguay & Southern Brazil, regularly to Cape Cod, & to Passamaquoddy Bay as a strey; also Bermuda	Common
Menidia menidia (Atlantic silverside)	Sands or gravelly shores	Southern part of Gulf of St. Lawrence & Nova Scotia coast to Mass. Bay to Chesapeake Bay & Woods Hole	Very common
Scophthalmus aquosus (Windowpane)	Shoal-water fish	Coastal waters of eastern N.A. from the Gulf of St. Lawrence to S. Carolina; most abundant west & south of Cape Cod, north & east of which it is confined to favorable localities	Most common except locally
Pseudopleuronectes americanus (Winter flounder)	Inshore muddy sand patches of eelgrass to between 25 and 45 fathoms	Atlantic coast of N.A. from the coastline out to the offshore fishing banks.	Most common shoal water flounder

Species	Habitat	Range	Abundance in New England
Alosa aestivalis (Blueback herring)	Salt water	South of northern Florida, north to southern N.E. in abundance: north to Cape Brenton, Nova Scotia	Abundant
Alosa pseudoharengus (Alewife)	Anadromous coastal	Gulf of St. Lawrence & north Nova Scotia south to North Carolina; landlock species also exist in Lake Ontario and in the Finger Lakes of New York	Very abundant
Brevoortia tyrannus (Atlantic menhaden)	Coastal waters	Atlantic coast of America from Nova Scotia to Eastern Florida, Gulf of Mexico to Argentina	Once abundant but species population declining
Anchoa hepsetus (Striped anchovy)	Coastal waters	Abundant from Chesapeake Bay to the West Indies and South to Uruguay; north as a stray to Maine and to the outer coast of Nova Scotia; a more southerly fish than the other anchovy	Very limited
Anchoa mitchilli (Anchovy)	Sandy beaches and the mouths of rivers	Coast of the U. S. from Maine to Texas, chiefly west & south of Cape Cod	Common
Osmerus mordax (Smelt)	Estuaries found within 2 or 3 fathoms	East coast of N. America from Eastern Labrador, Strait of Belle Isle, to Virginia;also in New Hampshire and Maine	Common

Species	Habitat	Range	Abundance in New England
Anguilla rostrata (American eel)	Breed far out to sea but develop either in estuarine situations or fresh water. Seek muddy bottom & still water	Coasts and streams of west Greenland, eastern New Foundland, Strait of Bell Isle, and northern side of Gulf of St. Lawrence south to Gulf of Mexico, Panama, West Indies, and rarely to the northern coast of South America	Universal
Fundulus heteroclitus (Mummichog)	Sheltered shores where the tide flows over beds of eelgrass or salt hay. Tidal creeks, salt marshes, brackish waters	Coast of N. America, from the Gulf of St. Lawrence to Texas, Port au Port Bay, on the west coast of Newfoundland is most northerly limit	Very common
Fundulus majalis (Striped killifish)	Restricted to immediate neighborhood of land	Coast of U. S., from vicinity of Boston to Florida	Very common
Enchelyopus cimbrius (Four beard rockling)	Bottomfish; shallow water to 25-30 fathoms, smooth muddy sand	Both sides of N. Atlantic. Northern part of Gulf of St. Lawrence & northeastern coast of Newfoundland to Narragansett Bay & Long Island Sound	Common
Merluccius bilinearis (Silver hake)	Coastal and open waters independent of depth	Continental shelf of eastern North America., northward to the Newfoundland Banks, southward to the offing of S. Carolina. Most abundant between Cape Sable & New York	Common

Species	Habitat	Range	Abundance in New England
Clupea harengus (Atlantic herring)	Coastal and open waters	Both sides of N. Atlantic north of Norway, Ireland, Spitzbergen and White Sea; south to Straits of Gibraltar; north to Labrador and Greenland, south to Cape Cod and Block Island	Once abundant but now species population declining
Ammodytes americanus (Sand lance)	Found chiefly along sandy foreshores, also over the shoaled parts of the offshore fishing banks.	Atlantic coast of N. Amer. from Cape Hatteras to the Gulf of St. Lawrence, northern Newfoundland & northern Labrador, perhaps to Hudson Bay	Very plentiful
Gasterosteus aculeatus (Three-spined stickleback)	Shore fish; estuarine	Coasts & fresh waters of the northern hemisphere; from Labrador, the Strait of Belle Isle and northern Newfoundland to lower Chesapeake Bay on the Eastern Coast of America	Very plentiful
Morone americana (White perch)	Coastal fish restricted in seaward range Breeding in fresh or brackish water and permanently landlocked in many fresh ponds and streams.	Atlantic Coast of North America from the Gulf of St. Lawrence & Nova Scotia to South Carolina.	Common
Mugil cephalus (Mullet)	Coastal waters	Both sides of the temperate Atlantic; from Brazil to Cape Cod on the American coast	Limited

APPENDIX H

REPTILES AND AMPHIBIANS

Reptiles and Amphibians of the Long Island Sound Area

Reptiles	Habitat	U. S. Range	Regional Occurrence	Status
Common snapping turtle Chelydra serpentina	Bodies of fresh water Fresh and salt water marshes	East to midwest	Conn. and LIS Study area	Common
Wood turtle Clemmys insculpta	Terrestrial	North east & south midwest		
Spotted turtle Clemmys guttata	Marshy meadows bogs, streams, swamps, ponds, ditches, etc.	East coast & north midwest	Conn. and LIS Study area	Common
Stinkpot Sternotheerus odoratus	Shallow, clear-water lakes, ponds & rivers	East & midwest U.S.		
Northern diamond-back Malaclemys terrapin	Coastal marshes, tide flats, coves, estuaries, inner edges of barrier beaches	East coast		
Western painted turtle Chrysemys picta belli		N. E. & parts of deep South		
Midland painted turtle Chrysemys picta marginata		East & midwest except deep south		
Eastern box turtle Terrepene carolina	Terrestrial, open woodlands, hide beneath logs or rotting vegetation, brooks and ponds	East coast to Georgia & midwest U. S.	Conn. and LIS Study area	Locally common, protected by N.Y. State
Bog turtle Clemmys muhlenbergi	Sphagnum bogs, swamps, clear slow moving meadow streams with muddy bottoms	Disjunct NE colonies		
Five-lined skink Eumeces fasciatus	Cutover woodlots with rotting stumps and logs, piles of sawdust, rocks, debris	East coast to midwest except Florida		

Reptiles	Habitat	U. S. Range	Regional Occurrence	Status
Northern red-bellied snake *Storeria occipitomaculata*	Mountainous or upland areas near open woods	East coast to mid-west except Florida & Georgia		
Northern brown snake *Storeria dekayi*	"City snake" hides in parks, trash, cemeteries, etc., or in bogs, swamps, marshes, marsh environment	Northeast	Conn. and LIS Study Area	Locally common
Eastern mud turtle *Kinosternon subrubrum*	Aquatic habitats, shallow water, inner edges of tidal marshes, offshore islands	East coast & SE	Conn. and LIS Study area	Common
Northern water snake *Natrix sipedon*	Swamps, marshes, bogs, streams, ponds, lake borders	East except deep south midwest	N.Y.: Nissequogue River Valley CT.: LIS Study Area	Locally common
Eastern garter snake *Thamnophis sirtalis*	Meadows, marshes, woodlands, hillsides, along streams, and ditches, damp ground etc.	East & midwest	Conn. and LIS Study Area	Common
Eastern ribbon snake *Thamnophis sauritus*	Streams, pools, bogs, swamps, shallow water	East coast (not FL) & midwest		
Eastern hognose snake *Heterodon platyrhinos*	Sandy areas, pine barrens	East coast & midwest	Conn. and LIS Study area	Locally common
Eastern worm snake *Carphophis amoenus*	Under stones, boards, rotting logs, moist earth, underground tunnels	East coast (not FL)	Conn. and LIS Study area	Rare on LIS

Reptiles	Habitat	U. S. Range	Regional Occurrence	Status
Northern ringneck snake *Diadophis punctatus*	Woodlands	East except deep south & N. midwest		
Northern black racer *Coluber constrictor*	Under flat rocks, pieces of rubbish, rotting logs, abundant most everywhere on land	East (not SE)	N.Y.: Cold Spring Hbr.	Locally common
Eastern smooth green snake *Opheodrys vernalis*	High altitudes, grassy or rocky meadows	NE & in Carolina mountains	Conn. and LIS Study area	Locally common
Black rat snake *Elaphe obsoleta*	Rocky woodlands, timbered hillsides to flat farmlands of the Coastal Plain	East & central midwest (not deep south & FL)	Conn. and LIS Study area	Rare on Long Island
Eastern milk snake *Lampropeltis doliata*	Fields, woodlands, rocky hillsides, river bottoms, under logs, stones, etc.	NE & midwest (not FL)		
Northern copperhead *Agkistrodon contortrix*	Rocky, wooded hillsides, mountainous areas, sawdust piles	NE & midwest	N.Y.: Nissequogue R. Valley, Port Jefferson CT.: LIS Study area	Common
Timber rattlesnake *Crotalus horridus*	Lowlands near swamps & cypress-bordered streams, also hilly regions	NE & midwest		
Mudpuppy *Necturus maculosus*	Lakes, ponds, rivers, streams, bodies of water	NE & northern midwest		

Reptiles	Habitat	U. S. Range	Regional Occurrence	Status
Red-spotted eft Diemictylus virdidescens	Ponds, small lakes, marshes, ditches streams, shallow, still water, forest floor	East		
Spotted salamander Ambystoma maculatum	Lakes, woodland ponds, under stones, boards, in moist environment	East & midwest (not FL)	Conn. and LIS Study area	Common
Marbled salamander Ambystoma opacum	Fresh water streams and marshes moist sandy areas, dry hillsides	East & midwest		
Northern dusky salamander Desmognathus fuscus	Brooks, springs, seepage areas, edges of small woodland streams	East & parts of SE	Conn. and LIS Study area	Locally common
Red-backed salamander Plethodon cinereus	Wooded or forested areas, logs, rocks of damp woodlands, hides under objects	NE to North Carolina & N midwest	Conn. and LIS Study area	Uncommon
Spring salamander Gyrinophilus porphyriticus	Cool springs, mountain streams, wet depressions beneath objects	NE & SE (not FL)		
Four-toed salamander Hemidactylium scutatum	Sphagnaceous areas, adjacent to woods, boggy woodland ponds	NE & SE (extreme N not FL midwest) disjunct in midwest	Conn. and LIS Study Area	Common on Long Island
Northern two-lined salamander Eurycea bislineata	Boggy swamps, brookside, hides under objects at waters edge, near springs or seeps, woodlands	NE & midwest	Conn. and LIS Study area	Common on Long Island
Eastern spadefoot Scaphiopus holbrooki	Areas of sandy or other loose soils	NE coast, & southern midwest		
American toad Bufo americanus	City backyards to mountain wildernesses, hides in moist places	East & northern midwest (not FL)		

Reptiles	Habitat	U. S. Range	Regional Occurrence	Status
Fowler's toad Bufo woodhousei fowleri	Fields, pastures, gardens, sandy areas, or in river valleys	NE, SE & Midwest	Conn. and LIS Study area	Common
Northern spring peeper Hyla crucifer	Woodlands near semipermanent ponds or swamps	East & midwest (not FL)	Conn. and LIS Study area	Common
Eastern gray treefrog Hyla versicolor	Mossy or lichen covered fences, forages aloft small trees or shrubs near or standing in shallow water	East & midwest	Conn. and LIS Study area	Common
Pickerel frog Rana palustris	Woodland springs & bogs, cool water, sphagum logs, rocky ravines, meadow streams, grassy fields, or weed covered areas, caves	NE to midwest spotty distribution south & west	Conn. and LIS Study area	Common
Northern leopard frog Rana pipiens	Meadows; swamplands; salt marshes	East, midwest to pacific states	Conn. and LIS Study area	Common
Green frog Rana clamitans melanota	Shallow freshwater	NE & northern midwest	Conn. and LIS Study area	Very common
Wood frog Rana sylvatica	Moist wooded areas	East & N. midwest	Conn. and LIS Study area	Common
Bullfrog Rana catesbeiana	Any body of fresh water	East to midwest NE & extreme N. midwest	Conn. and LIS Study area	Common
Blue spotted & Jefferson salamander Ambystoma laterale	Ponds, lakes	NE & extreme N. midwest	N.Y.: Greenport CT.: LIS Study area	Uncommon

Source - Compiled by Waterways Experiment Station, Vicksburg, Mississippi, From Coastal Wetlands Inventory of Long Island Sound, N.Y., U.S. Fish and Wildlife Service.

APPENDIX I

BIRDS

SPECIES SEEN IN BRANFORD HARBOR AND PAWSON PARK MARSH

Noble S. Proctor

Common Loon

Red-throated Loon

Horned Grebe

Pied-billed Grebe

Double-crested Cormorant

Great Blue Heron

Green Heron

Common Egret

Snowy Egret

Black-crowned Night Heron

Yellow-crowned Night Heron

American Bittern

Mute Swan

Canada Goose

Mallard

Black Duck

Green-winged Teal

American Wigeon

Greater Scaup

Common Goldeneye

Bufflehead

Oldsquaw

White-winged Scoter

Hooded Merganser

Common Merganser

Marsh Hawk

Sparrow Hawk

Clapper Rail

Virginia Rail

Sora Rail

American Coot

Semipalmated Plover

Killdeer

Black-bellied Plover

Common Snipe

Spotted Sandpiper

Greater Yellowlegs

Lesser Yellowlegs

Least Sandpiper

Semipalmated Sandpiper

Great Black-backed Gull

Herring Gull

Ring-billed Gull

Laughing Gull

Common Tern

Roseate Tern

Tree Swallow

Bank Swallow

Rough-winged Swallow

Barn Swallow

Cliff Swallow

Crow

Starling

Bobolink

Eastern Meadowlark

Redwinged Blackbird

Common Grackle

Brown-headed Cowbird

Sharp-tailed Sparrow

Seaside Sparrow

Tree Sparrow

Swamp Sparrow

Song Sparrow

Mourning Dove

Osprey

Birds of the Long Island Sound Area

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Common egret (Casmerodius albus)	Feed almost exclusively in marshes Primarily eat fish, but will kill almost any small mammal, amphibian, reptile, and some insects. Feed in both fresh and salt water marshes	There are a few nesting pair in the LIS area. Most are in rookeries on some of the north eastern islands. Usually nest in brush or small trees near the marsh.	They are almost wholly dependent on the wetlands for food & nesting and would disappear to the extent that their nesting areas in the marsh disappear.
Snowy egret (Leucophoyx thula)	Same as above	Nests in some of the same areas as the common egret, but is usually more numerous	Same as above
Great blue heron (Ardea herodias)	Same as common egret	Same as above	Same as common egret
Green heron (Butorides virescens)	Feed in both fresh and salt water marshes. Small minnows are commonly eaten along with other aquatic animals. May also feed in fields for insects (particularly grasshoppers.)	A few pair nest on some of the northeastern islands. More likely to nest alone than other herons.	Same as common egret
Black-crowned night heron (Nycticorax nycticorax)	Feeds in shallow ponds in the marsh. Eats mostly fish, but will also eat frogs, crayfish, some insects, etc.	The most common nesting heron in the LIS area. Rookeries of 100 + are present on some islands.	Same as common egret
Common loon (Gavia immer)	Primarily a fish eater. Prefer diving for fish in deeper waters.	Do not nest in Long Island Sound area.	Bays and coves of LIS are important as resting and feeding areas during migration. Also important as a watering ground
Red-throated loon (Gavia stellata)	Same as above		

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Horned grebe (Podiceps auritus)	Feed on a variety of aquatic animals. Food, in approximate order of importance, is fish, aquatic insects, mollusks, and small crustaceans	Do not nest in LIS area	Open waters of LIS are important as a wintering ground. They winter almost exclusively in coastal waters.
Pied-billed grebe (Podilymbus podiceps)	Feed on small aquatic animals. Crustaceans are most important. Also important are fish, mollusks, and insects.	May nest in some fresh water marshes or impoundments of LIS, but not an abudnant nester	Wetlands of LIS are important year round for this grebe. They prefer fresh water marshes for cover *
Double-crested cormorant (Phalacrocorax auritus)	Feed mostly on aquatic vegetation in fresh water ponds.	Nests in some fresh water ponds and impoundments of LIS	Readily adapt to highly-populated areas, but wild swans are dependent on wetlands for food and cover. Not native to N. America.
Gulls	At least 7 species of gulls may be seen in the LIS area at various seasons of the year. They feed on a variety of marine animals including fish, crabs, clams, shrimp, sea urchins, bird eggs, etc. Some species, like the herring gull and the ring-billed gull, are more apt to frequent garbage dumps. They may also feed on terrestrial insects such as Japanese beetles. At least three species nest within the LIS wetlands. They are: The herring gull (Larus argentatus): the black-backed gull (Larus marinas): and the laughing gull (Larus atricilla).		
Common tern (Sterna albifrons)	Feed almost entirely on fish	There are some very large nesting colonies of ferns in the LIS area. Most colonies are on islands with sandy beaches	Terns are completely dependent on wetlands for both food & nesting.
Roseate tern (Sterna dougallii)	Same as above		Same as above

*feeding, but may feed in the salt marsh, particularly in winter.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Sora (Porzana carolina)	Feeds on various mollusks and aquatic insects, and a variety of seeds from aquatic plants (particularly in the fall)	Nests mostly among fresh water vegetation.	Completely dependent on fresh water marsh for food & nesting.
Mourning dove (Zenaidura macroura)		Abundant in LIS.	
Tree swallow (Iridoprocne bicolor) Barn swallow (Hirundo rustica)	All are primarily insect eaters and may feed extensively over the marsh, particularly during migration. The tree swallow may also eat berries of some marsh plants (particularly bay berry)	May nest near marsh edge in suitable habitat.	Marshes can be an important source of food, but they are not totally dependent on marshes.
Common crow (Corvus brachyrhynchos) Fish crow (Corvus ossifragus)	Both are scavengers that may feed along the seashore and marsh edge. They will eat most any kind of marine life and also some berries of marsh plants	Nest in upland near marsh edge	The fish crow is more dependent on the wetlands as a source of food than is the common crow.
Yellow-crowned night herons (Nyctanassa violacea)	Same as black-crowned night heron	Nests on some islands, but not as common as black-crowned night heron.	Same as common egret.
American bittern (Botaurus lentiginosus)	Bitterns feed primarily in fresh water marshes on almost any small animal they can catch	They probably nest in suitable fresh water marshes throughout the LIS area.	Bitterns are completely dependent on marshes for food, cover and nesting.
Mute swan (Cygnus olor)	Feed mostly on aquatic vegetation in fresh water ponds.	Nests in some fresh water ponds and impoundments of LIS.	Readily adapt to highly-populated areas, but wild swans are dependent on wetlands for food & cover. Not native to N.A.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Canada goose (Branta canadensis)	Salt water and fresh water marshes provide the majority of food. In the LIS area eelgrass (Zostera marina) is an important food. Other important marsh foods are Spartina, widgeon grass (Ruppia maritima), spikerush (Eleocharis sp.), and sea-lettuce (Ulva sp.)	Not a common nester in LIS area	Primary importance of LIS wetlands is as a resting & feeding area during the spring & fall migration. Several thousand birds may use the area particularly in the fall.
Black duck (Anas rubripes)	Feeds about 3/4 on plans and 1/4 on animals. Bulrush, Spartina, and eelgrass are among the most important plant foods. Blue mussel (Mytilus edulis) and soft-shelled clam (Mya arenaria) are imporant animal foods. Other important plant foods are pondweed & wild rice	There is a small amount of nesting in some fresh water marshes and impoundments. Also nest in some salt marsh areas.	LIS wetlands are most important to the black duck as a wintering area. Wintering populations may number in the tens of thousands, accounting for a significant portion of the Atlantic Flyway population.
Mallard (Anas platyrhynchos)	Aquatic vegetation makes up about 90% of their diet. Bulrush (Scirpus sp.), eelgrass, and widgeon grass are among the most important foods in LIS area. Also important are wild rice, pondweed (Potamogeton sp.), smart weed (Polygomun), wild celery (Vallis reria spiralis), and wild millet (Echinochola sp.). They also eat some aquatic insects.	There is a small amount of nesting in some freshwater marshes and impoundments. May also nest in some salt marsh areas.	LIS wetlands are most important as a wintering and migration area. Several thousand are present even during mid-winter.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Green-winged teal (Anas carolinensis)	Over 90% of diet is plant food. Bulrush, glasswort, muskgrass, wild rice, wild millet, sedge (Carex) and Cyperus are most important food plants (particularly the seeds.)	Do not nest in LIS area	LIS wetlands are most important during migration when several thousand may rest and feed in fresh water and brackish water marshes.
American wigeon (Mareca americana)	Feeds mostly on aquatic vegetation, eelgrass and bulrush are important foods. Also important are pondweed, widgeon grass, naiad, cutgrass (Leersia oryzoides), and muskgrass. May also eat some aquatic insects.	Do not nest in LIS area	LIS wetlands are most important as a feeding and resting area during migration, when several thousand may be present. Some may over winter.
Greater scaup (Aythya marila)	Feed on both aquatic plants and animals during fall, winter and spring. Eelgrass is eaten when available. Pondweed, wild celery and naiad are also eaten. Mollusks are most important animal foods, particularly mudcrabs (Xanthidae), blue mussel (Mytilus edulis), and a number of snail species.	Do not nest in area	LIS wetlands are extremel important as a migration and wintering area for these ducks. Pop. No. ir the tens of thousands. A large portion of the Atlantic Flyway populatic winters in and around LIS
Common goldeneye (Bucephala clangula)	About 3/4 of food consists of aquatic animals and about 1/4 plant material. Crustaceans are a major part of diet (mostly crabs). Also eaten are aquatic insects, mollusks, and fish. Pondweed & wild celery are most important plants.	Do not nest in area	Bays & coves provide an important wintering area. Most likely to feed in deeper waters.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Bufflehead (*Bucephala albeola*)	Feeds mostly on animal food. Mud crabs (*Xanthidae*) and bay shrimp (*Paleomonetes sp.*) are most important. Insects are eaten when available.	Do not nest in LIS area	LIS wetlands are an important migration and wintering area. Winter population is in the thousands.
Oldsquaw (*Clangula hyemalis*)	They feed mostly on aquatic animals infall, winter, and spring. Various crustaceans, mollusks, and aquatic insects are eaten. The ribbed mussel (*Mytelis edulis*) is a favorite food.	No not nest in area	Open waters of LIS are an important wintering area.
White-winged Scoter (*Melanitta deglandi*) Surf scoter (*M. perspicillata*) Black scoter (*Oidema nigra*)	All three scoters feed mostly on marine animal life. Mollusks (clams, oysters, mussels), crustaceans (amphipods and barnacles), insects, fish and echinoderms are most often eaten. They may also eat some eelgrass. All three are expert divers and prefer feeding in deeper waters.	Do not nest in area	They feed in deeper water of LIS area during winter months.
Common merganser (*Mergus merganser*) Hooded merganser (*Lophodytes cucullatus*)	Primarily fish eaters, but will occasionally eat mollusks and crustaceans. Will eat fish as large as 7".	Do not nest in LIS area	LIS is most important as a migration and wintering area.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Marsh hawk (Circus cyaneus)	Primarily eats small rodents (Microtus and Sorex are favorite foods). Occasionally eats frogs, snakes, insects and small birds.	A few may nest in the vicinity of LIS. There are perhaps a dozen pair on some of the north eastern islands.	The Spartina salt marsh is the source of much of their food year round. They usually nest on higher ground within the wetlands area.
Osprey (Pandion haliaetus)	Almost exclusively fish eater. May catch fish up to 4 or 5 lbs. Prefers fishing over relatively clear water.	About 32 active nests in LIS area near the marsh edge. Many are on man-made structures such as telephone poles.	The wetlands are very important to osprey since this is its major source of food. One of the largest nesting pop's in the northeast is found in the LIS area.
Sparrow hawk (Falco sparverius)	During the summer they eat mostly insects (grasshoppers). May also eat birds, small mammals, reptiles, and amphibians	Mostly nests in the upland. May nest near the marsh edge	Wetlands provide valuable food year round.
Clapper rail (Rallus longirostris)	Feeds almost exclusively in the salt marsh. Over 95% of it$ food consists of decapods (crabs, crayfish, shrimp), mollusks, aquatic insects, clam worms, and small fish. Fiddler crags (Uca), are an important food.	Nests throughout the Spartina marsh	Completely dependent on wetlands for food & nesting.
American coot (Fulica americana)	Feeds on aquatic vegetation in fall, winter & spring. In the summer eat some insects, mollusks, crustacians, and spiders. Most important plant foods are naid, pondweed, bulrush, wild rice, muskgrass, and algae. Primarily feeds in fresh water marshes.	A few may nest in fresh water marshes and impoundments.	LIS wetlands are most important as a resting and feeding area during fall migration.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Plovers, Whimbrel, Godwits, and Sandpipers	There are over 25 species of these shore birds that do not nest in the LIS area but may be seen by the thousands during migration. Some (mostly dunlin) may over winter. Almost all bird or animal food in shallow pools, mud flats, and beaches. Principal foods are aquatic insects, worms, molluskes, crustaceans, sand fleas, small fish, etc, a few species (e.g. godwits) may eat some aquatic plant food (particularly seeds). Only the spotted sandpiper (Actitis macularia) commonly nests in the LIS area. All are completely dependent on wetlands for food.		
Killdeer (Charadrius vociferus)	Feeds in fields and along the marsh edge. Eats mostly insects, worms, spiders, ticks, snails, crabs, and crayfish	They usually nest in upland fields near the marsh edge. A few are known to nest in the LIS area.	Wetlands provide an important source of food.
Seaside sparrow (Ammospiza maritima) Sharp-tailed sparrow (Ammospiza caudacuta)	Both feed primarily in the marsh on various marsh insects. Leafhoppers, true bugs, flys and their larvae and sand fleas are all eaten.	Seaside often suspends its nest from Spartina alterniflora. Sharp-tail usually nests lower in the dryer areas of the marsh (often	Both sparrows are completely dependent on marshes for food and cover. Seaside is restricted to the salt marsh, but sharp-tail may also occur in fresh water marshes.
Red-winged blackbird (Agelaius phoeniceus)	Feeds extensively in the marsh. Will eat both animal and plant foods. Most of the animal food is eaten in the spring & summer & consists of a variety of insects. Seeds of various plants are also important food.	Nests among tall marsh vegetation. Prefers fresh water marshes.	Marshes are important for both food & nesting.
Tree swallow (Iridoprocne bicolor)		Breeds in wooded swamps. Nests in tree holes, bird boxes, dock pilings.	Common to abundant migrant fall, winter, spring.

SPECIES	FOOD REQUIREMENTS	NESTING AND COVER REQUIREMENTS	EXTENT OF DEPENDENCE ON WETLANDS OF LIS
Eastern meadowlark (Sturnella magna)		Salt marshes & fields	Common coastal migrant
Common grackle (Quiscalus quiscula)		Wooded interior to coastal beaches	Common to abundant migrant.
Brown-headed cowbird (Molothrus ater)		Open country along coast	Common to abundant migrant, widespread breeder.
Swamp sparrow (Melospiza georgiana)		Lawns, parks, weedy fields and swamps	Common to very common fall migrant; uncommon in winter; local breeder.
Song sparrow (Melopiza melodia)		Breeds in trees, building cavities, bird houses, and rarely in trees	Abundant resident.

SOURCE:

Information listed in this table was compiled from the Long Island Sound Regional Study and standard ornithological texts.

APPENDIX J

MAMMALS

MAMMALS OCCURRING ON WETLANDS IN LONG ISLAND SOUND

SPECIES	RANGE	HABITAT	STATUS
Opossum (*Didelphis marsupialis*)	East, central, southern U.S.; throughout Long Island (L.I.)	Upland animal but frequents marsh edge for food	Common
Masked shrew (*Sorex cinereus*)	Northern U.S. & Canada; throughout L.I.	Occurs in almost every type of habitat; may nest in dryer areas of marshes	Very common
Star-nosed mole (*Condylura cristata*)	Northeast U.S. and southeast Canada; L.I. sound coast	Low, wet ground near streams and marshes preferred	Local, scarce
Eastern cottontail (*Sylvilagus floridanus*)	Eastern two-thirds of U.S.; throughout L.I.	Feeds on plants along marsh edge. Lives in brush and other upland areas	Common
New England cottontail (*Sylvilagus transitionalis*)	New England and Appalachians. local	As in eastern cottontail	Uncommon
Meadow mouse (*Microtus pennsylvanicus*)	Northern and northeast U.S. & Canada, throughout L.I.	Low moist areas, thick vegetation. Common in smooth cordgrass marshes.	Abundant
Muskrat (*Ondatra zibethicus*)	Most of U.S. & Canada	Restricted to and completely dependent on wetlands	Common
Red fox (*Vulpes vulpes*)	U.S. & Canada except western Great Plains; throughout L.I.	Mixture of woodlands & open country. Feeds on rodents and other items at marsh edge	Common
Raccoon (*Procyon lotor*)	Most of U.S.; throughout L.I.	Along water including marshes, with woodlands or rocky cover nearby	Common

MAMMALS OCCURRING ON WETLANDS IN LONG ISLAND SOUND

SPECIES	RANGE	HABITAT	STATUS
Long-tailed weasel (Mustela frenata)	Most of U.S.; throughout L.I.	All land habitats near water	Local resident
Mink (Mustela vison)	All U.S. except southwest, throughout L.I.	Along streams & other bodies of water	Uncommon
Striped skunk (Mephitis mephitis)	All U.S. throughout L.I.	Semi-open country, usually within range of water	Common
River otter (Lutra canadensis)	Most of U.S. & Canada, where present. Extirpated on L.I.	Aquatic. Fresh water stream systems	Rare
Dolphins, whales, porpoises, seals		Marine	Varying, some endangered
House mouse (Mus musculus)	Cosmopolitan	Woodlands, marsh edge, high marsh, dwellings	Common
Norway rat (Rattus norvegicus)	Comospolitan	Marsh edge, high marsh, dwellings and vicinity	Common

Source - Compiled by Waterways Experiment Station, Vicksburg, Mississippi, from the Long Island Sound Regional Study and standard mammalogy texts.

APPENDIX K

CULTURE

STATE OF CONNECTICUT

CONNECTICUT HISTORICAL COMMISSION
59 SOUTH PROSPECT ST. HARTFORD, CONNECTICUT 06106
AREA CODE 203 566-3005

February 13, 1975

Mr. William F. McCarthy
Chief, Environmental Resources Branch
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02154

Ref: NEDPL-R, Executive Order #11593 review, Branford Harbor, Connecticut

Dear Mr. McCarthy:

This letter is in response to your request of January 22, 1975 for a dredging project review in Branford Harbor at Branford, Connecticut. Accordingly, a member of my staff inspected the area in question.

It is our opinion that while this dredging project will have a definite visual impact on the surrounding area, no properties listed on, or potentially eligible for the National Register of Historic Places, will be adversely affected.

Sincerely,

John W. Shannahan
Director

SJR/eb

Connecticut Archaeological Survey, Inc.

1615 Stanley Street — New Britain, Connecticut 06050 — (203) 225-7481

September 22, 1975

Mr. Joseph L. Ignazio, Chief,
Planning Division, Dept. of the Army,
New England Division, Corps of Engineers,
424 Trapelo Road,
Waltham, Massachusetts, 02154

Dear Mr. Ignazio:

We have made a reconnaissance survey of the Marsh Extension area for the Branford Harbor project. We have also contacted Mr. Tom Neff of MIT regarding soil borings taken in the extension area.

Our Survey, as determined by test pitting to depths of 3', revealed no cultural materials in the Marsh Extension area. Soil borings done by Mr. Neff indicated a uniform layer of organic silt to a depth of 20 - 25'. Although it is possible that shell middens or other cultural material may be contained in this organic silt, neither our test pits, nor the test borings gave indications of this. Therefore, it would be my opinion that the Marsh Extension area does not contain significant amounts of cultural material.

As I mentioned in my letter of August 7, 1975, we would like to do an initial reconnaisance of areas "A" and "B" before dredging operations begin. If you would authorize this aspect of the project, we could schedule it within the next two to three weeks.

Sincerely,

Frederic W. Warner,
Executive Director

FWW/r

cc: John W. Shannahan,
Connecticut Historical Commission

APPENDIX L

PETITION OPPOSING THE PROJECT

A PETITION OF BRANFORD RESIDENTS IN OPPOSITION TO MARSH CREATION PROJECT PROPOSED BY U.S. ARMY ENGINEERS ON LOWER REACH OF BRANFORD RIVER

JUNE 4, 1975

Submitted by Robert R. Kirkland,
A Resident of Branford, Connecticut
On Behalf of the Signatories to
this Petition
August-September 1974

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 8/20/74
[illegible]	33 Todds Hill	9/12/74
Shelly garrison	177 Pawson Park Rd	9/4/74
Roberta S. Temple	191 Pawson Park Road	09-04-74
[illegible]	195 Pawson Rd -	9/12/74
[illegible]	190 Pawson Rd	9/12/74
[illegible]	26 Pawson Trail	9/12/74
[illegible]	26 Pawson Trail	9/12/74
[illegible]	219 PAWSON RD	9/12/74
[illegible]	69 Pawson Rd.	9/12/74
[illegible]	93 Pawson Rd.	9/12/74
[illegible]	41 Pawson Trail	9/15/74
[illegible]	41 PAWSON TRAIL	9/15/74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Richard Hall	Pierson Pk.	9/12/74
Mr. + Mrs. Robert Bradley	Bradley Ave.	9-12-74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 19/19
Thomas E Sloane	14 Wakefield Rd Branford	8/23/74
Eliz N. Chapman	134 Pawson Rd Branford	8/25/74
Clarence G. Chapman	134 Pawson Rd Branford	8/25/74
Edith R. Munk	130 Pawson Rd. Branford	8-25-74
Ann Pinchbeck	122 Pawson Rd Branford	8/25/74
Tommy Pinchbeck	122 Pawson Rd. Branford	8/25/74
Ruth Pinchbeck	122 Pawson Rd. Branford	8/25/74
Don Gordon	138 Pawson Park Rd Branford	25 Aug 74
Jean DeC. Chapman	138 Pawson Park Rd Branford	25 August
Lyndia Harold	154 Pawson Rd Branford	25 Au
William J Harold	154 Pawson Rd. Branford	Aug
Alyce Kenton	146 Pawson Rd. Branford	8/
Robert Kenton	" " " "	8/
John B. Kirby	137 Pawson Rd Branford	8/
Walter D Bradley	211 Totoket Rd Branford	8/
Barbara J McNamara	211 Totoket Rd Branford	8/2
Eileen D. Kirby	54 Harding Avenue Branford	8/2
[illegible]	[illegible]	8/25
Patty [illegible]	[illegible]	8/2

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 1974
[illegible]	19 Terry Ln.	8-31-74
[illegible]	2 Terry Lane	8-31-74
[illegible]	" "	8/31/74
[illegible]	17 Terry Lane	8/31/74
Elaine B. Shane	14 WAKEfield Rd. BRanford	9/6/74
Adrian M. Stuntevant	Wakefield Rd.	9/7/74
[illegible]	Wakefield Rd	9-7-74
[illegible]	Wakefield Rd	9-7-74
[illegible]	" "	9-7-74
[illegible]	" "	"
Christine Johnson	" "	9-7-74
Margaret M. Ritter	Spring Cove Rd.	9-7-74
Allen L. Gaedcke	26 Wakefield Rd.	9-7-74
Elizabeth Stuntevant	28 Wakefield Rd	9-7-74
Richard H. Gallagher MD	44 Wakefield Rd	9-8-74
Betty M. Gallagher	44 Wakefield Rd	9-8-74
Nancy Gaylord	93 South Main Street	9-9-74
Clarence W. Titus	58 Standard Ave	9-9-74
Joyce Farnsworth	40 Taylor Rd.	9-9-74
Judy K. Titus	15 Prospect Hill Rd	9-9-74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Walter J Melville	Stony Creek Rd.	8-9-74
Bruce R. Hayes	46 Riverside Dr.	9/9/74
[illegible]	3 McClintock Ct.	
Arnold J. Spear	41 Brookside Rd.	9/9/74
Mary Ann Marino	21 Arrowhead Ln	9-9-74
Ruth Duncan	105 Beckett Ave	9-9-74
[illegible]	21 Sunset Hills Rd.	9/9/74
Ted R. Johnson	8 Wildwood Drive	9/9/74
Carl Wittler Jr	21 Wildwood Dr.	9/9/74
Edward J Reynolds	20 Yocago Ave	9-9-74

PETITION

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NAME	ADDRESS	DATE
Edward W. Lewis	2 Fenway Rd Branford Ct	9/10/74
Eileen W. Lewis	Stony Creek	9/10/74
Stephen M. Jordan	22 Clark Ave	9/10/74
John T. Colter	16 Fenway Rd	9/10/74
Shirley H Colter	16 Fenway Rd	9/10/74
Helen L. Hendenger	17 Fenway Rd	9/10/74
[illegible]	17 Fenway	9/10/74
Wm Stacy Jones	" "	9/10/74
T Bielunke	48 Sand Mine Hts.	9/12/74
Ellen Hadley	9 Sunset Manor Rd.	9/12/74
Katherine A Reif	5 Sunset Manor Rd	9/12-74
Rita M Cahill	7 Manor Road	9-12-7
Anne A Kolonke	7 Manor Road	9-12-7
Will C. Lyon	16 Manor Pl	9-12-7
[illegible]	16 Manor Pl	9-12-7
[illegible]	15 Sunset Beach Rd	9-12-7
Mrs. Ellen C. T. Ludlow	21 Sunset Beach Rd.	9-12-7
[illegible]	22 Sagamore Cove Rd.	9-12-7
[illegible]	34 Sagamore Cove Rd.	9-12-7
[illegible]	[illegible]	9/12

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
S.H. Voloshin	Branford Yacht Club	8/23
Ted Hook	Branford, Conn	8/23
Mabel Gratton	Branford, Conn.	9/9
Walter A. Lange Jr	Branford, Conn	9/9
Louise C. Lange	Branford, Conn.	9/9
Richard Walker	Branford Conn	9/9
[illegible] Bragg	Branford Conn.	9/9
[illegible] Mirigo	Branford Conn.	9/9
Linda M Hirst	Branford Ct.	9/9
Charles Manchi	Branford	9/9
[illegible] Powers	Branford Conn.	9/9
[illegible] Vannella	6 Fenway Rd., Branford, Ct.	9/9
[illegible] Di Nino	"	9/9
[illegible] (Jean) Spicer	2 Fenway Rd Bfd	9/10
[illegible] Spicer	2 Fenway Road Branford Ct.	9/10
[illegible] Linda Ericson	4 Sagamore Cove Road	

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Ann B. Court	20 Fenway Rd. Branford, Ct.	8/21/74
Shirley D. Beacom	1 Fenway Rd. Branford. Ct.	8/21/74
Shirley J. Bice	101 Seaview Ave, Branford, Ct.	8/22/74
Beulah B. Gleason	9 Linden Beach Rd Branford Ct	8/22/74
Ellen Bailey	16 Bradley Ave Branford.	8-22-74
Barbara Zdanski	35 Knollwood dr. Branford	8-22-74
Charles R. Gleason D.D.S.	1 Fenway Rd. Branford	8-23-74
[illegible]	61 North Main St Branford	8/23/7
[illegible]	127 Cedar St. Branf. Ct.	
Bernardine S. Tafeen	24 Meadow Brook Road Branford Con	
Raymond Affinito	208 Damascus Rd Branford, Conn.	
[illegible]	BYC.	
Alice R. Ford	90 Harwood Ave. BRF.	
Colin Bennett	171 Linden Ave - Branford Con	
John W. Patuzzo	Branford Youth Club	8-23-
[illegible]	— — — — — —	
Marge Gotham	Branford Youth Club	8-23-7
[illegible] Zigel	193 PINE ORCHARD RD. BRANFORD	
John V. Leonard	Branford Yacht Club	8

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Howard Dorfman	27 Gutting Rd, P.O.	Sept 13, 19
Walter Dorfman	27 Gutting Rd, P.O.	Sept 13, 19
Vincent B. Linsley	21 Fenway Road	Sept 14, 19
John H. Sievert	30 Fenway Rd	Sept 14, 19
Wayne F. Shepard	26 Fenway Rd	Sept 14, 19
Alice L. Shepard	26 Fenway Rd	Sept 14, 1971
Edward Pierce	25 Fenway Rd	Sept. 14, 19
Bernard V. Dwyer	25 Fenway Rd	Sept 14, 19
Joanne W. Linsley	21 Fenway Rd.	Sept. 14, 1
Ann L. Bohan	132 Sunset Hill Dr.	Sept. 14, 197

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Simon F Sudar	33 Pawson Landing Dr. Bfd, Ct.	8-23-74
Barbara C Fox	19 Druid Ave. Bfd. Ct.	8-26-74
Karen Ryan	167 Linden Ave Branford Ct.	8-29-74
Richard Ryan	" " " "	8-29-74
Gail Ryan	167 Linden ave. Bfd. Ct.	8-29-
Mrs. Elena Fields	175 Linden Ave. Bfd. Ct.	8/29/
Jane Langley	175 Linden Ave Bfd. Ct.	8/29/74
Andrea Huguet	201 Linden Ave Bfd ct.	8/30/7
[illegible] Huguet	201 Linden Ave Bfd, Ct	8/30/7
Marion Sudar	33 Pawson Landing Bfd.	8-30-7
[illegible] Miller	231 Linden Ave. Bfd	9/5/7
Ellen D. Miller	" " " "	9/5/
Edith C Hayden	235 Linden Ave Bfd	9/5/7
Jerry F. Hayden	" " "	9/5/74
[illegible]	255 " " "	9/5/74
Louis C. DeAngelo	271 " "	9/5/74
Clifford J. Collins	275 Linden Ave.	9/5/74
Mildred M Carlson	295 Linden ave	9/5/74
Hazel Stoyka	41 PENT RD.	9/5/74
Bob Collins	34 MAHIBY ST.	9/5/74

PETITION

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NAME	ADDRESS	DATE 8/8
Anne M. Freund	29 Maltby Street	9-5-74
Betsy B. Allen	30 Maltby St	9-5-74
T Dewitt allen	30 Maltby St	9.5.74
Donald W Pait	25 Maltby St	9-5-74
Sheila Porter	20 Maltby St.	9/5/74
Janet W. Loughlin	8 Dorn St	9/5/74
Marilyn Burns	13 Sybil Ave	9/6/74
Ralph Burns	13 Sybil Ave	9/11/74

PETITION

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NAME	ADDRESS	DATE 18/18
[illegible]	22 Pawson Landing	8/22/74
Helen Y Ling	22 Pawson Landing	8/22/74
Roberta M. Trink	26 Pawson Landing	8/22/74
Alvin L Trink	"	"
Kathleen B. Burns	25 Pawson Landing	8-22-74
Robert S Burns	25 Pawson Landing Branford Ct	8/22/74
Jean M. Atwater	18 Pawson Landing Dr.	8/22/74
Lucien C Atwater	" " "	"
Joanne C. Manies	10 Pawson Landing	8/23/74
Edward Manies MD	"	"
Mary C Cook.	15 Old Pawson Landing	8/23/
Kate C. Coote	15 Old Pawson Landing	8/23/
[illegible]	2 " " "	8/23/
[illegible]	" " "	"
E a. Balogh	15 Wilcox Place, Bfd.	8/23/74
Donald R. Welch	17 Montgomery Pl Bfd	8/23/
Mary R Welch	17 Montgomery Place	8/23/
Jane Martini	63 Chestnut St. Bfd.	8/28/74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 13/13
J. L. Kelly Clark	113 Linden Ave.	Aug. 23, 197
E. C. Hawthorne	14 Old Pawson	8/23/74
Audrey S. Hawthorne	14 Old Pawson Landing	Aug.
Laura S. Adamson	9 Montgomery Pkwy.	8-26-
Robert W. S. Adamson	9 Montgomery Pkwy	8/26/
Mary E. Corey	6 Montgomery Pkwy	8/26/7
[illegible]	6 Montgomery Pkwy	8-26-7
[illegible]	133 Linden Ave.	8/26/7
[illegible]	133 Linden Ave.	8/26/74
Thomas E. Purcell	123 Chestnut St	8/28/74
Debbie Purcell	45 Marjorie Dr.	8-28-74
[illegible]	301 E. MAIN ST.	8-28-74
[illegible]	38 Sybil Ave.	8/31/74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Jean Hawley	102 Plymouth Colony	8/21/74
James F. Ryan	19 Old Lawson Landing	8/22/74
Robert Lavery	22 Hart Ave.	8/22/74
[illegible]	303 Plymouth Colony	8/22/74
[illegible]	22 Hart Ave	8/22/74
Richard Schroeder	Camp 45 Pamphlin Cove	8/26/74
Patricia Schroeder	Camp 45, Pamphlin Cove	8/26/74
Gerald Hawley	102 Plymouth Colony	8/22/74

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1.

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
1 Muriel D. Hancke	41 Langhiers Cove	8/24/74
2 Ed Hancke	41 Langhiers Cove	8/24/74
3 Mary Bagley	42 Langhiers Cove	8/24/74
4 Francis J. Ellyn	Camp 15 Langhiers Cove	8/24
5 Sadie Ryan	19 Dawson Landing Dr.	9/14/74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Norman [illegible]	315 East Main St	Aug 23, 1974
[illegible]	686 W. Main St.	Aug. 23, 1974
[illegible]	[illegible]	Aug 23, 1974
George Marra	10 Fuon Rd	aug 23, 1974
[illegible]	83 Harbour Village	Aug 23, 1974
[illegible]	223 Thimble Island Rd	8/23/74
[illegible]	83 Harbour Village	8/23/74
[illegible]	69 Court ST Bran	8/23/74
[illegible]	69 Court Street	8/23/74
[illegible]	26 Cherry St Bfd.	8/25/74
[illegible]	5 Orchard Hill Rd	8/26/74
Lillian M. Olejarczyk	17 Mill Creek Pl.	9/13/74
[illegible]	[illegible]	[illegible]
[illegible]	40 Commill Place Bfd	9/13/74
[illegible]	35 Montgomery Pkwy Bfd	9/14/74
[illegible]	35 Montgomery Pkwy Bfd.	9/14/74
[illegible]	75 Briarwood Lane	9-15-74
[illegible]	75 Briarwood Lane	9/15/74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS		DATE
[illegible]	14 Stonegate Dr	Bfd.	8/27/7[illegible]
Kevin Robertson	18 Saw Mill Rd		8/27/74
[illegible]	31 Sunny Lane		8/27/74
[illegible]	17 Peddlers Ln.	Bfd	8/28/74
[illegible]	3 Patrick Lane	Bfd	8/28/74
[illegible]	235 Pawson Rd.	Bfd.	8/28/74
[illegible]	129 Damascus Rd.	Bfd	8/28/74
[illegible]	11. Collins Dr.	Bfd.	8/28/74
[illegible]	11. Collins Dr.	Bfd.	8/28/74
[illegible]	177 Northford Rd	Bfd.	8/28/74
[illegible]	5 Cottage St	Bfd	8/29/74
[illegible]	117 [illegible]	Bfd	8-29-74
[illegible]	169 Northford Rd		
[illegible]	68 Hillwood Rd	Bfd.	9/9/74

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS		DATE
[illegible]	26 Palmer Wd Cir	BFD	8/26/74
[illegible]	206 N. Main St.	BFD	8/26/74
[illegible]	132 Short Dr.	BFD	8/26/74
[illegible]	Oak Gate Dr	BFD	8/26/74
[illegible]	Linewood Ave	BFD	8/26/74
[illegible]	John St	BFD	8/26/74
[illegible]	Pistello Dr	BFD	8/26/74
[illegible]	!		
[illegible]	Leetes Island Rd	BFD	8/26/74
[illegible]	Oak Ridge Rd.	BFD	8/26/74
[illegible]	26 Brocketts Pt	BFD	8/26/74
[illegible]	26 E. Main St	BFD	8/26/74
[illegible]	Branford Conn		8/26
[illegible]	114 Seaview Ave.		

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Carl Mangs	Wakefield Rd.	8/30/.
L. C. Tippett	McKinnel. Ct.	9 - 9.
[illegible]	[illegible] ROAD	9/9/7[illegible]
[illegible]	54 Cochran Ave	9/9/74
Sven B Ulfers	62 Oak Rd	9/12/74

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Jana Wilson	5 Pawson Rd	8/26/74
Maurice Nolan	10 Pawson Rd	8/26/74
Muriel Corey	26 Montgomery Pkwy	8/26/74
Harmon C. Corey	26 Montgomery Parkway	8/26/74
Irene M. Anderson	34 Pawson Road	8/27/74
Mary English	177 Linden Avenue	8/27/74
Mary Ann Cossey	21 Old Pawson Rd	481-9605
Jim McKay	21 Old Pawson Rd	481-3645
Patricia Petrone	21 Old Pawson Rd.	"
Ric Anderson	2 Old Pawson Rd	481-975
Cheri Anderson	2 Old Pawson Rd	481-975
Madeline B. Green	Hudson Court	488-329
Irene S. Jacobs	13 Old Pawson Rd.	488-2
[illegible]	13 Old Pawson Rd	4882
J. R. & Mrs. N. Levi	Brookwood Dr.	8/28/7
[illegible]	20 East Main st	481535

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Mildred M. Carelli	20 Sunset Hill Drive, Branford	8.28-74
Frank C. Fiannini	365 E. Main St. Branford	8/28/74
Phyllis Dowdy	15 Company Ave	8/28/74
[illegible]	7 Sunset Hill Dr., Branford Ct	8/
Frank J. Tolopka	41 Rock Pasture Dr. Bfd.	8/28/74
Dorothy Powell	27 Mayflower Rd Bfd	8/28/
William Edwards	29 Wildwood Dr. Bfd	8/28/
Ralph Schwanfelder	5 Sagamore Cove Rd Bfd.	8/28/7
Linda Carey	32 Woodside Dr. Bfd.	8/28/74
Emil Petrini	28 Old Dawson Rd. Bfd.	8/28/7
[illegible]	10 Montgomery Parkway "	8/28/7
[illegible]	16 Old Dawson Rd Bfd.	8/28/7
[illegible]	28 Old Dawson Rd.	8-28-7
[illegible]	31 Deer Knoll	8-30-74
[illegible]	" "	

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
[illegible]	30 Cherry Rd Branford	9/3/74
[illegible]	521 Jones Island Rd.	9/3/74
[illegible]	14 Corbin circle	"
[illegible]	17 Alps Rd - Bfd.	9/3/74
[illegible]	" " " "	"
[illegible]	19 LESTER ISLAND RD	9/6/74
[illegible]	40 Taylor Pl. Bfd	9/6/74
[illegible]	7 Maple St, Branford	9/6/74
[illegible]	15 Summit Hill Dr.	9/10/74
[illegible]	232 Pleasant Point	9/10/74
[illegible]	17 Maltby St	9/10/74
[illegible]	9 Bergen Rd.	9/10/74
[illegible]	19 Maltby St	9/10/74
[illegible]	17 Maltby St	9/10/74
[illegible]	2 Battle Hill Ct	9/10/74
[illegible]	31 Youngs Ave	9-11-74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 6/6
[illegible]	[illegible]	8/23/74
Denis M Carlson	84 Hamlin Lane	8/23/74
Dennis Smith	23 Beckett Ave	8/26/74
David LeCrone	64 Alps Road	8/26/74
[illegible]	[illegible]	[illegible]

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE 8/8
R. Robert Reinhold	169 Hotchkiss Grove Rd.	8/30/74
Ellen C. Hayden	120 Brushy Plain Rd.	8/30/74
Laurie L. Mitchell	3 Elmo Rd. Stony Creek	8/30/74
Eunice Leister	64 Harrison Ave.	8/30/74
George F. Dreyer	18 Willow Road	8/30/74
George T. Brown	288 North Main St	8/30/74
Mildred Lindsley	57 Briarwood Lane	8/30/74
Reid Smith	177 Northford Rd.	8-30-74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Dorothy Martin	49 Elizabeth St	8/29/74
Jennifer Martin	49 Elizabeth St.	8/29/74
[illegible]	Cedarcrest Rd.	8-29-74
Sally Rice	93 Linden Ave	8/29/74
Molly Perkins	82 Sunset Beach Rd.	8/29/74
Florence B Geers	31 Cottage St	8/25/74
Christine M. Lamar	28 Pawson Rd.	9/2/74
[illegible]	26 Pawson Rd	9/2/74
Elyan C. Taylor	26 Pawson Rd	9/2/74
Rita A. Donegan	145 Linden	9/2/74
[illegible]	Linden Pl.	9/2/74
[illegible]	145 Linden Ave	9/2/74
Daniel B. Donegan	145 Linden Ave	9/2/74
Charles L. [illegible]	17 Linden Ave	9/2/74
[illegible]	4 Pawson Rd.	
Jean T. Clapp	153 Linden Ave.	9/2/74
[illegible]	163 Linden Ave	9/2/74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Robert A Kolstad	3 Wakefield Rd	9/2/74
Barbara B. Kolstad	" " "	9/2/74
Ellen A. Refsbeck	75 Rogers Rd.	9/3/74
H T Gregory	167 Pawson Rd.	9/10/74
Elizabeth H. Gregory	167 Pawson Rd.	9/10/74
[illegible]	135 Pawson Rd.	9/10/74
[illegible]	135 Pawson Rd	9/10/74
Richard A. Chapman	134 Pawson Park Rd.	9/10/74
[illegible]	135 Pawson Rd.	9/10/74
[illegible]	61 Island View Ave	9/11/74
Mrs Helen Smith Sanders	61 Island View Ave	9/11/74
Mrs Sally Smith Kirby	45 Island View Ave	9/11/74
[illegible]	" " "	9/11/74
Mr. & Mrs. Walter J. Kiesle	199 Linden Ave	9/12/74

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PETITION

2

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
George R. Libby, Jr.	38 Old Pawson Landing Dr.	8-16-
Lola Libby	" " " "	" "
Lola Crawford	38 Pawson Landing Dr.	8/21/
Robert R Kirkland	30 Pawson Landing Dr	8/21/7
Dorothy T. Kirkland	30 Pawson Landing Dr	8-21-74
[illegible]	24 Eaton St	8-22-7
[illegible]	167 E. Main St.	8/23/7
John J. Fitzpatrick	Totoket Rd.	8/23/74
[illegible]	104 No. Main St. Bannus,	8/23/74
[illegible]	9-11 W. MAIN ST.	8/23/74
[illegible]	941 W. Main St	8/23/74
[illegible]	217 Main St.	8/23/7
[illegible]	32 Park Place	8.23.7
[illegible]	73 Rose Hill Rd	8/25/74
Lloyd Libby	35 Pawson Landing Dr.	8/25/74
[illegible]	34 Pawson Landing Dr	8/25/7
[illegible]	27 Old Pawson Rd.	8/26/74

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PETITION

2

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Charlotte D'Amello	Pavilion Dr	9/6
Jay Firth	13 Elinor Place	9/6/74
Joe Fondario	17 Old Smugglers	9/6/74
[illegible] Fillo	26 Wakefield Rd.	9-7-74
[illegible] Harrison	120 Queach Rd.	9/7/74
[illegible] Harrison	" " "	
[illegible] Welch	19 Sandra Drive	9/7/74
[illegible] Gordon	58 Grove St.	9-7-74
[illegible] Haywood	19 Frost St.	9-9-74
[illegible] Eastwood	95 Forest Rd Rd. Gilford	9-9-74
[illegible] Swanson	Box 29 Dillsboro, North Carolina (a former resident)	9-9-74
[illegible] Domaleski	256 Shore Dr. Branford	9-9-74
[illegible] Renzo	106 Highland	9/9/74
[illegible] Pagani	30 Orchard Hills Rd	9/9/74
[illegible] A. Flemister	51 Brushy Pl. Rd.	9/9/74
[illegible]	10 Hanna Lane	9/9/74
[illegible] Dixon	234 Hope Dr	9-9-74
[illegible] Sedillo	57 Cloven Ave	9 9 74
[illegible] Hadley	699 Foote Dr Rd	9/9/74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
William H. Leete	51 Harbor St	Sept. 4, 19-
[illegible]	[illegible]	[illegible]
[illegible]	10 Hamre La	Sept 4, 19-
[illegible]	804 E. Main St	Sept 4, 19-
[illegible]	78 Meadow ST.	Sept 4, 19-
R. E. Robinson	44 Stanwood Rue	Sept 4, 19-
John Wilson	802 E. Main St	Sept 4, 19-
Donald Howard	3 Oakdale Rd	Sept 5, 19-
Charles Morawski	184 Maple Rd	Sept 6 19-
Margaret Stanton	156 Harbor St	Sept 6 19-
[illegible]	101 Pine Orch. Rd.	9/6/74
Gary F. Roberts	31 Flat Iron Rd, Hfd	9/6/74
Robert A. Smith	30 Northford Rd Wallingford	9/6/74
Dale L. Rose	7 Kings Grant Rd	9/6/74
[illegible]	Averal Pl Clinton Branford	9/6-74
Richard McManus	8 & Tyler St E. H.	9/6/74
Richard N Rose	7 Kings Grant Rd	9/6/74
K.B. Gebhardt	29 17 Lawson Rd., Clinton BRANford	9/6/74

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PETITION

3

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
A. J. LaMontagne	139 Linden Ave	8/28/74
Regina R. Moher	159 Linden Ave	8/28/74
Elizabeth L. Hemingway	16 Dove Street	8/28/74
Charles L. Smith Jr.	10 Pawson Rd	8/28/74
Anna T. Elwell	" "	"
S. Moravski	Mill Creek Rd	8/29/74
[illegible] Amato	S. Summer Island Rd Ext	8/29/74
[illegible] Jaudes	104 North Main St.	8/29/74
Carl Brown	22 Summer Is. Rd	8/29/74
Karl Mingsby	12 Hill St. Granite Bay	9/14/74

11

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Fred Sturm	118 Pilots Pt	8/29/74
A. Catalano	Nature Food Centres	8-29-74
[illegible] Wheeler	Briarwood Lane	8-29-74
a Bourne	8 Woodside Drive	8-29-74
[illegible] Morgan	72 Union St	8-29-74
D Dudgeon	6 Field Place	8-31-74
[illegible] Gregory	167 Pawson Rd.	8/31/74
[illegible]	9-[illegible]	8/31/74
[illegible] Prichett	14 Crouch Rd.	9/3/74
[illegible] Kaminsky	15 Pine Orchard Rd	9/3/74
[illegible] Williams	97 Hotchkiss Grove Rd	9/3/74
[illegible]	1 [illegible] Ave	9/3/74
[illegible] S. Hickey	118 So. Montowese St	9/3/74
[illegible]	162 So. Montowese St	9/4/74
E. Etzel	31 Montgomery Pkwy	9-4-74
Edward Roberts	9 Court St.	9-4-74
[illegible]	[illegible]	9-4-74
[illegible] Lewis	6 Field Rd. 31	9-4-74

11

PETITION

3

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Richard Meyers	13 Pawson Trail	8/28/74
Patti Ward	140 Himewood Ave.	8/27/74
Marge Johnson	48 Wakefield Rd.	8/28/74
Peter H. Falk	8 Ave Hotchkiss Gr.	8/28/74
Robin Backer	4 Pawson Rd.	8/28/74
Allan H. Dunbrand	350 Clark Ave Bfd	8/27/74
Betty Garrepy	Branford	8/28/74
Barbara Munson	113 Pond Orchard Rd.	8-28-74
L Bruzzi	8 Wilford Rd	8/28/74
	5 Wilford Rd	8/25/74
	23 Cottage St.	8/28/74
	5 Hemingway St.	8/28/74
	10 Astor Ave	8/28/74
	13 Hopkins Ave	8/28/74
Marilyn Thompson	32 207 1/2 Linden	8/29/74

11

PETITION

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NAME	ADDRESS	DATE
William B. Judge	31 Pawson Road	8/25/74
Thomas Ennis	12 Linden Ave	8/25/74
C N Stevens	12 Pawson Rd	
Edward P. Richard	33 Maltby Ln.	8/26/74
Anne Sadowski		
Pat Stanton	29 Wilford Rd	8-26-74
Sam Dendas	24 7th Ave.	8-26-74
Mrs. Wm. Peck	54 Elmwood	8-26-74
	Elmwood Ave	8-26-74
	171 Linden Ave	
William B. Judge	31 Pawson Rd	8/26/74
Brian Peck	5 Maltby St	8/26/74
Pat Wolfen	6 Ozone Rd	8/26/76
Jayne Kilmartin	213 Linden Ave	8/25/74
Duane M. Bladen	Pawson Road	8/26/74
Barbara A. Cummings	30 Wilford Rd.	8/26/74
Ann P. Becker	4 Pawson Rd.	8/26/74
Anthony S. Becker	4 Pawson Rd.	8/26/74

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PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Mrs Nora Anne Brown	48 Sybil Ave	8/24/74
Phyllis Palm	27 Summer Hill Rd. Ext.	8/24/74
Kathleen Kootz	21-8th Ave	8/24/74
[illegible]	[illegible]	[illegible]
Janice C. Kirby	137 Pawson Road	8-24-74
[illegible]	7 River Rd.	8-24-74
[illegible]	767 Lindley Ave	8-25-74
[illegible]	Pawson Park	8/25/74
[illegible]	57 Seaview Ave.	
[illegible]	34 Pawson Park	8-25-74
[illegible]	55 Yowago Ave	8-25-74
[illegible]	21 Southwest Lights	8-25-74
[illegible]	43 Bayberry Ln	8/25/74
[illegible]	102 Sunset Hill Rd	8/25/74
[illegible]	25 Linden Ave	8/25/74
[illegible]	26 Waverly Rd	8/25/74
[illegible]	5 Selden Ave	8/25/74
[illegible]	25 Seaview Ave	8/25/74

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PETITION

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NAME	ADDRESS		DATE
R/E M Cutcheon	148 Cont Mar	St Bfd Ct	8/23/74
Bill Fuerga	21 Clarendon St	Bfd. Ct	8/23/74
[illegible]	17 Rogers Ct	Bfd Ct	8/23/74
[illegible]	9 Sybil Ave.	Bfd. Ct.	8/23/74
[illegible]	4 Dow St.	Bfd. Ct.	8/23/74
[illegible]	70 Linwood Ave	Bfd Ct.	8/24/74
[illegible]	32 Fenway Rd	Bfd. Ct.	8/23/74
[illegible]	55 Waverly Pl. Rd.	Bfd. Ct.	8/23/74
[illegible]	10a Crouch Rd	Bfd. Ct.	8/23/74
[illegible]	10a Crouch Rd.	Bfd. Ct.	8/23/74
[illegible]	13 Waverly Pl	Bfd. Ct.	8/23/74
[illegible]	34 Waverly Rd	Bfd Ct	8/23/74
[illegible]	[illegible]	[illegible]	8/23/74
J. J. Collins	33 Fenway Rd.	Bfd. Ct.	8/24/74
[illegible]	3 Waverly Rd.		
[illegible]	3 Dow St	Bfd Ct	8/24/74
[illegible]	97 Hotchkiss Grove	Bfd	8/24/74
[illegible]	[illegible]	[illegible]	8/27/74

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PETITION

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WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
John P. Lagge	14 W. Haycock Pl.	Sept 4, 197
Michael L. Peffley	5 Hemingway Street	September 5, 197
Jay M. Falk	Hotel Kiss Cove	Sept. 6 74
P S Randall	32 7th Ave Hotchkiss	Sept 6-74
C E Swift	4 Tyler Ave.	9-9-74
H Wyatt Mabry	Dorset	9/9/74
Charles P. Wise	Johnsons Marina	9-9-74
Jim Fiore	Sybil Ave	9/9/74
Dick Mills	24 Medley Cove	9/9/74
Samuel J Rogers	9 7th ave.	9/9/74
Mr. & Mrs. C. Olson	52 S. Montowese	9/10/74

11

PETITION

WE, THE UNDERSIGNED RESIDENTS OF BRANFORD, CONNECTICUT, ENJOY OUR NATURAL HARBOR AND MARSH AREA AS IS, AND OPPOSE THE MARSH CREATION PROJECT PROPOSED BY THE U.S. ARMY CORPS OF ENGINEERS BECAUSE OF ITS EXPERIMENTAL NATURE, INADEQUATE CONSIDERATION OF ECOLOGICAL AND ENVIRONMENTAL FACTORS, ELIMINATION OF OPEN WATER VIEWS, DETRIMENTAL EFFECT ON PROPERTY VALUES AND THE POSSIBLE HEALTH DANGERS OF DUMPING HIGHLY POLLUTED DREDGING SPOILS NEAR HUMAN HABITATION IN AN AREA SUBJECT TO WIDE TIDAL VARIATION.

NAME	ADDRESS	DATE
Diane Hubley	697 Pettes Island Rd.	9/9/74
[illegible] Orzechowski	75 Florence	" "
Jo Ann Morgan	72 Union St	9/9/74
Linda A. Brown	Great Hill Rd. N. Branford	9/9/74
Stephanie Marias	Breman St E. 14	9/9-74
Richard Haebel	23 Lanphier Cove Road	9/9/74
Frank D'Amello	Pavilion Dr.	9/9/74
Valerie L. Close	294 Shore Drive	9/10/74

APPENDIX M

COMMENTS DIRECTED TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Mansfield Professional Park, Storrs, Connecticut 06268

June 16, 1975

Joseph L. Ignazio, Chief, Planning Division
Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

The draft environmental statement for Branford Harbor Maintenance Dredging and Marsh Development, Branford, Connecticut sent to the U. S. Department of Agriculture, Washington, D.C. was referred to the USDA, Soil Conservation Service in Connecticut.

Following are our comments:

1. The suitability of the soils for the proposed action has been considered. There docsn't seem to be another satisfactory disposal site within reasonable distance.

2. The E.I.S. does not describe conservation measures to be applied. On page 1-3 there is no discussion of either temporary or permanent vegetation on constructed dike. Suitable seeding recommendations can be obtained from the New Haven County Soil and Water Conservation District.

3. The proposed project will not effect any prime farm land or existing conservation systems. There are no proposed project actions by the Soil Conservation Service in the affected area.

We appreciate the opportunity to comment on this proposed project.

Sincerely,

G. Halstead acting

Robert G. Halstead
State Conservationist

cc: Council on Environmental Quality, Washington, D.C.
R. M. Davis, Administrator, SCS, Washington, D.C.
Office of Coordinator of Environmental Quality Activities, USDA, Washington, D.C.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

June 18, 1975

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

The draft environmental impact statement "Maintenance Dredging and Marsh Development Project Branford Harbor, Connecticut," which accompanied your letter of April 15, 1975, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments

Sections of the draft environmental impact statement dealing with aspects other than marsh creation are thorough and comprehensive with regard to the aquatic resources for which the Department of Commerce, National Marine Fisheries Service is responsible. However, the paucity of site-specific data precludes an accurate review and evaluation of marsh development at Branford Harbor, particularly with regard to benthic fauna of the marsh site, project impacts on these organisms, alternative sites, potential for mud wave formation, protection of existing marsh areas, and potential for and mechanisms to cope with structural failures.

The agencies charged with reviewing this statement have had little or no opportunity to provide expertise to the conceptual design of this project. We believe, therefore, that the Corps of Engineers' Waterways Experimental Station (WES) should establish and maintain close working coordination with concerned groups regarding this matter.

Specific Comments

Section I - Project Description

Page 1-1, paragraph 1.02 - We suggest inserting the term "under utilized" for "unuseable" in the discussion of dredge material as a resource.

Page 1-1, paragraph 1.04 - The applicability of this salt-marsh creation project to other locations is tenuous. Implying that techniques developed at Branford will be directly utilizable elsewhere may be an erroneous conclusion in view of the limitations of design and natural characteristics identified for the site. A biological assessment of the mudflat should be made prior to marsh creation to determine what resources will be displaced because of the project. The draft environmental impact statement should describe methods to be used in assessing impacts of new marsh development on existing, adjacent marshes. Expected ecological characteristics of the new Pawson Marsh should be presented.

Page 1-3, paragraph 1.08 - Point (C) states that an eight-acre marsh will be large enough to clearly note the effects of marsh creation on an estuary. The branch of WES charged with assessing the feasibility of marsh creation was established for a period of approximately five years beginning in 1973. This implies that all projects must be completed by the end of Fiscal Year 1978. Although no time frame for spoil material consolidation has been described, it appears that planting could not occur earlier than the spring of 1976. Allowing six months for report preparation, there remains only two growing periods for assessment studies. In view of the probable need for a period of spoil material compaction, we are concerned that there may not be sufficient time for an adequate study of the project.

Point (D): It should be noted whether or not existing tidal creeks in Pawson Marsh will be exposed to blockage, isolation, or filling by the deposition of spoil material from the marsh creation project.

3.

Page 1-4, paragraph 1.10 - Phase (3) is described as site preparation and propagation of selected marsh plants. We believe this to be the most important aspect of the proposal with regard to the success or failure of this project, yet little data of any significance is presented regarding these matters. The post-propagation data collection and monitoring period may not be possible due to the time constraints previously mentioned.

Page 1-5, paragraph 1.12 - Since "current planning" envisions that the existing marsh will form the inside boundary of the containment area, and that the weir structure will be "... about a foot above the elevation of the edge of the existing marsh.", we recommend that a sandbag dike or similar revetment concept be implemented to insure protection of the existing marsh area.

Page 1-6, paragraph 1.13 - The Massachusetts Institute of Technology has performed extensive studies with regard to the feasibility and engineering aspects of this project. Information presented in the MIT study should be cited where applicable, and we suggest that a copy of that report should be appended to future environmental impact statements regarding this proposal.

Page 1-6, paragraph 1.15 - In view of the discussion in paragraph 1.14 relative to the final evaluation of the marsh, it appears that only a few "local species" will be capable of survival on the created marsh. The draft environmental impact statement should present a complete list of those species other than smooth cordgrass, which may be utilized in marsh creation. Additionally, the statement should discuss the potential of insufficient compaction of spoils necessary to support planting efforts by the spring of 1976.

Page 1-7, paragraph 1.18 - The draft environmental impact statement should not ignore the fact that knowledge gained from this project may not be applicable to many other areas. Further, environmental costs should be considered equally with feasibility and design characteristics.

4.

Section 2 - Environmental Setting Without the Project

A number of geodetic control survey monuments are located in the general vicinity of Branford Harbor. Also a number of tidal bench marks are located in the proposed project area, as described in the attachment. If there is any planned activity which will disturb or destroy these monuments, the Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, of which the National Geodetic Survey is a part, requires not less than 90 days notification in advance of such activity in order to plan their relocation. This Department also recommends that funding for this project include the cost of any relocation required for these monuments. We request that this advance notification be given to: Director, National Geodetic Survey, Room 304A - WSC #1, 6010 Executive Blvd., Rockville, Maryland 20952.

Section IV - The Environmental Impact of the Proposed Action

Page 4-4, paragraph 4.09 - Although "...marsh configuration and retaining structures have been planned and designed to allow normal tidal exchange through the tidal creeks which traverse the marsh and prevent changes in salinity, nutrient exchanges, and detrital export in the marsh system", the statement should document how this is to be accomplished.

Page 4-4, paragraph 4.12 - The discussion regarding potential failure of the project should address situations such as dike failure, over-pumping of revetments, inundation of the existing marsh, failure of the material to compact, mud wave creation, failure of the vegetation to stabilize the area, and loss of marsh stability if the artificial structure deteriorates at some later date.

Page 4-10, paragraph 4.31 - The term "stabilized" should be defined particularly with regard to the marsh at the end of the first or second growing season. It should be noted whether slumping or lateral migration will interfere with attainment of stability.

5.

Section VI - Alternatives to the Proposed Action

Page 6-8, paragraphs 6.30 and 6.31 - Justification for selection of Pawson Marsh as the site for a marsh creation effort should be presented. This justification should be supported with information on alternative sites outside of Branford Harbor's extensive estuarine marshes rather than relating to only local sites. Criteria used in eliminating sites because of "excessive pumping distance" should be presented. Additionally, we are interested in how the physical configuration, availability of colonizing plants, and the creation effort's applicability to other areas in New England were identified.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION

TO : Regional Food and Drug Director, Region I
Attention: Mr. Darrell J. Schwalm, Shellfish Specialist

DATE: June 20, 1975

FROM : Chief, Northeast Technical Services Unit

SUBJECT: Draft Environmental Statement, "Maintenance and Marsh Development Project", Branford Harbor, Connecticut, by Department of the Army, New England Division, Corps of Engineers, Waltham, Massachusetts, April 1975

We have reviewed the above report and offer the following comments:

Our National Shellfish Register indicates that both inner and outer Branford Harbor are classified as prohibited for the taking of shellfish. The closure line is about 2,100 feet south of the beginning of the dredging in the outer harbor. The proposed spoil areas are located up in the Branford River, a considerable distance from approved shellfishing waters. Due to the distance of the dredging operations and spoil areas from approved waters, it seems unlikely that the water would be affected.

In Appendix I on page 4, the National Shellfish Sanitation Program Manual of Operations is referred to as a two-part manual. There are actually three parts, Part I, Part II, and Part III.

Also in Appendix I on page 1, the first three lines refer to a map showing water quality classification. We did not find that map in our copy.

The review was made by Virgil E. Carr, Staff Engineer.

James L. Verber

JLV:EC:lmm

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203

REGION I

April 22, 1975

IN REPLY REFER TO:
1D

Mr. Joseph L. Ignazio
Chief, Planning Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

I have received and reviewed your draft environmental statement for Branford Harbor Maintenance Dredging and Marsh Development, Branford, Connecticut, dated April 1975.

The proposed maintenance dredging activities will not directly involve any development activities within the purview of grant programs funded by the Department of Housing and Urban Development. Therefore, I have no comments to offer on the draft.

Sincerely,

Frank V. Del Vecchio

Frank V. Del Vecchio
Environmental Clearance Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

July 1, 1975

Mr. Joseph L. Ignazio, Chief, Planning Division
New England Army Corps of Engineers
424 Trapelo Road
Waltham, Ma. 02154

D-COE-B35002-CT

Dear MR. Ignazio:

We have completed our study of the draft EIS concerning maintenance dredging of Branford Harbor and the marsh development. The draft raises some environmental concerns which we will address in the following comments:

The Maine Department of Transportation has published a study entitled, Saltmarsh Relocation in Maine, 1974. This study discusses the material suitable for supporting marsh growth: the plant species, their nutrient requirements, productivity, and intraspecies variation. According to this study, it would seem that the bottom spoils from Branford Harbor may need fertilization in order to support marsh life. The final EIS should discuss the suitability of the dredge material to support marsh life as well as the amount of time that will be needed to have the marsh stabilize. A discussion of what safe guards will be needed in the interim prior to growth to control erosion at the tidal interface should be included.

On page 1-3 one of the justification on which you based the decision to build an experimental eight acre marsh was that it could be located adjacent to Pawson Marsh without blocking any of the major tidal creeks. Because of the close proximity of several creeks we feel that the final statement should further address the potential erosion-deposition problems and provide background information to support your conclusion on page 1-3.

Branford Harbor has in the past supported beds of eastern oysters and hard shelled clams. It is also our understanding that these areas have been closed to shell fishing due to the Water Quality and potential contamination of the shell fish crop. However, before this project destroys this valuable shell fish resource we feel that you should consider transplanting the shell fish in an effort to regenerate other poorly productive areas. This would be consistant with the continuing effort to strengthen the shell fishing areas along the Connecticut Coast which state and federal programs are fostering.

In order to make the final EIS a more complete assessment, we feel that more specific information on the salt marsh should be included. We have therefore, in accordance with our national rating system, rated this project LO-2. A explanation of which is enclosed.

Thank you for sending us a copy of the draft statement and your patience in awaiting our comments. We would appreciate receiving a copy of the final statement.

Sincerely yours,

Wallace E. Stickney, P.E.
Director
Environmental Impact Office

EXPLANATION OF EPA RATING

Environmental Impact of the Action

LO -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully, the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTHEAST REGION
JOHN F. KENNEDY FEDERAL BUILDING
ROOM 2003 J & K
BOSTON, MASSACHUSETTS 02203

ER 75/402

June 16, 1975

Division Engineer
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

In response to Mr. Ignazio's letter dated April 15, 1975, we have reviewed the draft environmental impact statement concerning the maintenance dredging and marsh development, Branford Harbor, New Haven County, Connecticut, and offer the following comments:

General Comments

In general, we believe that in most respects the statement adequately addresses the impacts of the proposed maintenance dredging and disposal phase of the project as they pertain to the areas of expertise and jurisdiction of this Department. However, as our specific comments will detail, there are certain aspects concerning the marsh development phase that we believe could be more adequately discussed.

Detailed Comments

Section 1.04, Page 1-1: This section discusses the applicability of this particular project to the New England region as a whole. We submit that while the project does have merit in the context of applied ecological research, to say it will be applicable to the entire region is an overstatement. No two sites have exactly the same physical and biological characteristics and a method of marsh building that is successful or unsuccessful in Branford, Connecticut, does not determine the success of a similar experiment in Maine, for instance, or elsewhere.

Section 1.08, Page 1-3: The last sentence of this section states that the eight-acre marsh can be located without blocking any major tidal creeks within Pawson Marsh. However, Figure 3 indicates that while not directly blocking the tidal creeks as shown, the enlarged lower portion of the new marsh could alter tidal currents at the mouth of the creeks.

We believe that this possibility could be eliminated by reversing the enlarged and narrow portions of the new marsh.

Section 1.15, Page 1-6: This section should address the problem that could be encountered with stabilization of the dredged slurry and subsequent hindering of planting. If the dredged material does not consolidate sufficiently to support the weight of a mechanical planter or human being, planting of salt marsh vegetation could be delayed beyond the spring of 1976.

Section 1.22, Page 1-9: The first sentence is at variance with some previous statements made by the Corps of Engineers' personnel concerning the economics of land-based disposal versus sea disposal. Sea dumping has been described to be the most economical method of spoil disposal, with land-based disposal being much more costly. We refer to a letter dated July 8, 1973, from Colonel Mason to Senator Ribicoff regarding Housatonic River in which he states, "In retrospect, the low bidder's per-cubic-yard cost of $6.47 for land disposal illustrates the added cost of alternatives to ocean disposal. Under current market conditions, ocean-disposal work is being bid at approximately one-half to two-thirds of that cost." No costs are mentioned in this statement at the prevailing linear foot rates for bulkheading, and we question whether this project could have wide applicability to other routine maintenance dredging projects. In any event, estimated costs of this project should be given and comparisons made to other projects of similar volume.

Section 2.08, Page 2-3: An additional item that would aid in evaluating impacts on ground water would be a statement in Section 2.08 and in Section 2.10 as to whether any encroachment of saltwater or other reversal of hydraulic gradient has been noted, or a simple statement of the principal direction of ground-water gradient for each of the major aquifers.

Disposal of dredging spoils on a tidal flat to develop a marsh land environment should not significantly affect ground-water resources; however, this conclusion would be strengthened by evidence of seaward hydraulic gradients.

Section 2.16, Page 2-4: It has come to our attention that the Branford Wire Works were located for many years in the northern reach of the project area. Such an activity would seem likely to have produced considerable quantities of industrial waste products and leachates from open stored raw materials and end products. Were this the case, then abnormally high levels of heavy metals and other pollutants may be found in dredging spoil from this part of the project area. If this were to be true and the spoil material used in the experimental marsh, the entire effort could prove to be self-defeating. The statement does not establish that material of this kind is usable for the stated purpose, i.e., creation of a tidal marsh.

To resolve this area of question, we offer the following recommendations:

1. Acquisition and chemical analysis of sediment samples from the potential spoil materials sufficient to establish whether localized concentrations of heavy metals and other industrial pollutants do exist in the project area.

2. If such concentrations are found to be present, determine whether material of that chemical nature is compatible with the goal of establishing a marsh area having a normal ecosystem.

We further recommend that this subject of question and concern, as well as the above recommendations, be discussed in the final environmental statement.

Section 2.73, Page 2-21: The statement of human occupancy in the area lead us to believe there may well be archeological resources to be found and possibly adversely impacted in the area of the project. We would urge the Corps to contact the State Archeologist, Dr. Douglas F. Jordan, University of Connectiuct, State Archeological Museum, Storrs, Connecticut 06268, to determine the likelihood of archeological resources and follow through with a survey as may be necessary.

Although this draft would appear adequate concerning historical site considerations, it is wholly inadequate for consideration of archeological values. A detailed discussion of archeological values in the final environmental statement and also a display of Dr. Jordan's comments is desirable.

Section 4.09, Page 4-5: As stated earlier, we foresee the possibility of alteration of the tidal currents caused by the enlarged lower end of the proposed marsh and suggest that the enlarged portion be placed at the upper or northeast end of the existing marsh.

Section 4.19, Page 4-7: Although the harbor is closed for the taking of shellfish, young oysters and other shellfish can be relocated to cleaner waters and eventually utilized. Thus, the covering of eight acres of mud flat will be destructive to this potential resource.

Section 6.30, Page 6-8: This section neither adequately describes nor considers the alternate marsh development sites. We favor the site at Page's Cove as being more appropriate for marsh development for two reasons. First, the development of a new marsh adjacent to property owned by the Ecclesiastical Society of a local church would not be as destructive to existing resources as utilizing the Pawson Marsh site; and, second, the Pawson site already contains sizable marsh acreage while the Page Cove site contains very little.

Sincerely yours,

Roger Sumner Babb

Roger Sumner Babb
Special Assistant to
the Secretary

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
Commander (mep)
Third Coast Guard District
Governors Island
New York, N.Y. 10004
(212) 264-4916

5922/19.b-I
26/75
16 June 1975

Mr. Joseph L. Ignazio, Chief
Planning Division
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

A review has been completed of the draft environmental impact statement for the Maintenance Dredging and Marsh Development project in Branford Harbor, Connecticut. The review and comments contained herein are generally limited to areas of environmental impact within the jurisdiction of the Coast Guard by law, by special expertise, or as stipulated by the Council on Environmental Quality in their Guidelines for the preparation of Environmental Impact Statements (1 August 1973).

Marine Pollution.

Field studies by Scott and Pine (Journal, Water Pollution Federation, Vol. 47, No.3, March 1975, pp. 553-561), indicated that the maximum dissolved oxygen depression for a dredging project they were studying occurred near the discharge area of the spoil containment area. Paragraph 1.09 indicates that dredging will be accomplished by hydraulic dredging, with material being pumped to two disposal areas contained by dikes. Because the settling efficiency of sediment in the containment area can be related to retention time and particle size, turbity (and presumably oxygen demand), may be reduced by utilizing long skimming weirs, and by first dredging the finer sediments.

Paragraph 5.01 states that "...turbidity resulting from dredging in Branford will be masked by background turbidities." While this may be the case visually, it may not accurately describe the situation in terms of physical and biological impact.

Oil Spills.

Paragraph 1.09 indicates that earth moving equipment will be used to construct dikes. Oil associated with this equipment may be spilled into Branford Harbor. Spillage of oil and hazardous substances is, however, specifically prohibited by Section 311 of the Federal Water Pollution Control Act as Ammended in 1972. Measures, including: proper maintenance of construction equipment; arrangement of fuel handling areas so as to permit spills to be contained before reaching the waterway; instructing personnel not to dispose of oil and other such materials into drains or

into Branford Harbor directly; and other precautions should be planned to prevent spillage. If, in spite of such planning a spill does occur, the Third Coast Guard District is to be notified immediately at 264-8753 during working hours, or 264-8770 at other times.

Commercial Fishery Conservation.

Marshes tend to be ecologically highly productive. As this marsh borders on Long Island Sound, an important habitat for numerous commercial fishes, it is desirable to recognize any significance which these specific dredge disposal areas have to existing commercial fish.

The timing of spoil deposit operations should be planned so as to have the least impact on organisms which presently utilize the affected aquatic sites. Fingerlings, for example, may be much more prevalent at these sites during particular months of the year.

General.

The intent of the project to create additional wildlife habitat might not be met if marshland which is shoreward of the disposal sites undergoes ecological succession and is then permitted to be developed. This comment could be addressed in paragraph 4.34.

These comments have been presented to assist you in obtaining a more thorough assessment of the environmental impacts of the project, and in order to assist you in minimizing adverse impacts. The opportunity to express these concerns is appreciated.

Sincerely yours,

Fred Rubel

F. N. RUBEL
Environmental Protection Administrator
Marine Environmental Protection Branch
By direction of the District Commander

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

MAY 5 1975

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division, Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Reference: NEDPL-R

Dear Mr. Ignazio:

This is in reply to your letter of April 15, 1975, requesting comments of the Federal Power Commission on the draft environmental statement for the Branford Harbor maintenance dredging and marsh development project, Branford, Connecticut.

The proposed project would involve maintenance dredging of 2.3 miles of channel in Branford Harbor and the utilization of the dredged material to develop a marsh.

These comments of the Federal Power Commission's Bureau of Power are made in accordance with the National Environmental Policy Act of 1969 and the August 1, 1973, Guidelines of the Council on Environmental Quality. Our principal concern with proposals affecting land and water resources is the possible effect of such proposals on bulk electric power facilities, including potential hydroelectric development, and on natural gas pipeline facilities.

Review by our staff indicates that the proposed maintenance dredging and marsh development project would not appear to have any significant effect on matters of concern to the Federal Power Commission.

Very truly yours,

T. A. Phillips
Chief, Bureau of Power

STATE OF CONNECTICUT
STATE DEPARTMENT OF HEALTH
79 ELM STREET HARTFORD, CONNECTICUT 06115

OFFICE OF PUBLIC HEALTH

May 21, 1975

566-5646 Attention of: NEDPL-R

Department of the Army
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Gentlemen:

Douglas S. Lloyd, M.D., Commissioner of Health, has asked me to review and reply to your draft environmental statement for Branford Harbor Maintenance Dredging and Marsh Development, Branford, Connecticut. We have reviewed the plan as it affects two of the programs of the state department of health; namely, shellfish and mosquito control.

The proposed dredging and marsh development should have little or no influence on commercial harvesting of shellfish as the nearest activity is in the Thimble Islands between October and April each year. Recreational harvesting of shellfish between Branford Harbor area and Thimble Islands may be affected temporarily, but we can monitor the water quality during dredging, temporarily closing this portion for the harvesting of shellfish.

I have asked Mr. Julius Elston, chief of the Mosquito Control Section to comment on the plan and I have attached a copy of his reply. You will note that he feels the report has not adequately provided for mosquito control in the area. He mentions that no control is taken of approximately seven mosquito drainage ditches which carry tidal waters in a northwesterly direction and drain directly into the mud flat upon which a marsh is to be created by this project. In other words, the proposed marsh would effectively block all drainage from those mosquito ditches and result in the trapping of high tide water on the existing marsh, producing large stagnant pools of sheet water. He also feels that approximately ten to twelve acres of the existing Pawson Marsh will be cut off from tidal circulation by the construction of the proposed new marsh. He states that these stagnant areas will produce optimum conditions for the development of Aedes sollicitans, our most troublesome migratory salt marsh species. This species develops many broods each season and is capable of building up tremendous numbers in a relatively short time. Furthermore, this species has been repeatedly found naturally infected with the virus of Eastern encephalitis and is considered the prime vector of Eastern encephalitis along the New Jersey shore.

We, therefore, urge that some other alternate disposal site be used other than the mud flat adjoining Pawson Marsh for the fifty thousand cubic yards of dredged material.

Very truly yours,

David C. Wiggin

David C. Wiggin, Director
Environmental Health Services Division

M-18

CONNECTICUT STATE DEPARTMENT OF HEALTH May 5, 1975 ENVIRONMENTAL HEALTH SERVICE

SUBJECT: A review of the Draft Impact Statement for the Branford Harbor Maintenance Dredging and Marsh development Project

To: David C. Miggin, Director
Environmental Health Services

From: Julius Elston, Chief
Mosquito Control Section

DATE RECEIVED
Permanent
1975
File Code

I have reviewed the Environmental Statement for the Branford Harbor Maintenance Dredging and Marsh Development Project in Branford, Connecticut, prepared by the Army Corps of Engineers and it is my considered opinion that the implementation of the project will produce a severe and extensive mosquito breeding situation on the existing Pawson Marsh. The effect of this project on the life, health and safety of the citizens of Branford is a matter of some concern. Lack of insight in planning this project will have a potential impact on vector production and mosquito borne disease, particularly Eastern encephalitis and dog heart worm to say nothing of the nuisance potential of blood thirsty salt marsh mosquitoes and their detrimental effect on recreation and property values.

The evaluation of the effect of this project on the existing Pawson Marsh by the Army Corps of Engineers is superficial and unsound. On page 4-1 paragraph 4.09 Changes in Drainage Patterns. The statement is made that "Little change in the hydrologic regime of the existing marsh is expected." However, while the project avoids closure of the primary tidal creek in the existing marsh, no mention is made of approximately seven mosquito drainage ditches which carry tidal waters in a north westerly direction and drain directly into the mud flat upon which a marsh is to be created by this project. In other words the proposed marsh would effectively block all drainage from these mosquito ditches and result in the trapping of high tide water on the existing marsh producing large stagnant pools of sheet water.

On page 4-8 under Zoological, paragraph 4.22, the statement is made that "Since the proposed marsh development is of limited area, no significant increase in populations of nuisance insects (flies, mosquitoes) is expected." However, approximately 10 - 12 acres of the existing Pawson Marsh will be cut off from tidal circulation by the construction of the proposed new marsh. This will produce many small stagnant pools and a considerable number of larg areas of extensive sheet water along the existing ditches and in lower elevations of the marsh. These stagnant areas will produce optimum conditions fo the development of Aedes solllicitans, our most troublesome migratory salt mar species. Unlike many other Aedes species, this species develops many broods each season and is capable of building up tremendous numbers in a relatively short time. Furthermore, this species has been repeatedly found naturally infected with the virus of Eastern encephalitis and is considered the prime vector of Eastern encephalitis along the New Jersey shore.

If this project is carried through to completion as planned, the unfortunate people living in the Pawson Park area of Branford will pay the price in mosquito infestation and possible disease transmission. In view of the above and the temporary nature of chemical control, the increasing restrictions on insecticidal usage and the long term expense of chemical control methods, it should be urged that some alternate disposal site be used other than the mud flat adjoining Pawson Marsh for the 50,000 cu. yds. of dredge material.

JE/se
Encl.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
24 Wolcott Hill Road, P.O. Drawer A
Wethersfield, Connecticut 06109

Office of the
Commissioner

May 13, 1975

Mr. Joseph L. Ignazio
Chief, Planning Division
Department of the Army
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

Re: Branford Harbor Maintenance
Dredging and Marsh Development
Project

As requested, the Department of Transportation has reviewed the Draft Environmental Impact Statement for the above-referenced project. The draft, as written, appears to thoroughly address all associated impacts with regard to the proposal. However, a more detailed discussion of alternate disposal sites should be included. The development of an experimental marsh and/or wildlife habitat will provide useful information not only from an environmental standpoint but also in the selection of alternatives for future dredging proposals.

Very truly yours,

James F. Shugrue
Deputy Commissioner

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

July 29, 1975

Colonel John H. Mason
U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Mason:

The Department of Environmental Protection has reviewed the Environmental Impact Statement for the Maintenance Dredging and Marsh Development Project in Branford Harbor, Connecticut dated April 1975. Issues raised in this Department's review of the marsh creation aspect of the project were discussed with Waterways Experiment Station representatives on June 11, 1975 and WES provided additional information regarding the marsh proposal to the Department on June 26, 1975. These meetings provided us with a clearer understanding of certain aspects of the project. However, we find several areas of major concern which have not been resolved to date and which should be adequately addressed in the Final Draft of the Impact Statement.

At this time, we find no objection to maintenance dredging the navigation channel utilizing conventional disposal methods. It is noted that the channel could be variably dredged to the required depths utilizing the existing land disposal sites.

The Department has the following comments:

1. The area-wide utility and cost-effectiveness of marsh creation projects as an alternative to conventional spoil disposal methods are not adequately demonstrated in the draft EIS.

2. The design of the Marsh Development Project proposed in the Draft EIS may compromise the established policy of the State of Connecticut to preserve and protect its tidal wetlands. About 30% of the 51 acre Pawson Marsh may have its circulation and flushing blocked or inhibited as several tidal creeks will remain obstructed by retaining structures despite culverting.

3. Twenty acres of the marsh are owned and held in public trust by the State of Connecticut; the remainder is currently privately held. Potential damage to this extensive marsh system, which has been described as one of the best in the State, and the subsequent reduction in value and recreational use of this valuable Marsh unit, is a major concern of this Department.

4. Construction impacts and design specifications for retaining structures are not discussed in sufficient detail in the Draft EIS. Construction of the offshore retaining bulkhead will result in environmental disturbance over a considerably greater area than that enclosed by the dikes. If these retaining structures fail, or permit excessive amounts of sediment to leave the impoundment during or after dredging, considerable damage to adjacent intertidal and marsh areas could occur.

5. Ponding, de-watering of sediments, and stagnation due to nutrient loading from the spoil material, are not discussed as major problems in establishing a marsh with the particular spoil material at hand. If the retaining structure is permitted to "rot-away" as proposed, the new marsh may be undermined and eroded away. Dike geometry could cause adverse impacts as a result of changed tidal circulation and sedimentary regimes in the experimental area. Project monitoring details and operational considerations regarding the establishment of a marsh flora under the proposed conditions, have been inadequately addressed.

6. Given the nature of the dredge materials and the experimental nature of the project, it is doubtful the time available (to August 1977) for the Corps field activities will be sufficient to terminate the project successfully--ie to obtain information on the stabilization of predominately silty spoil by a viable marsh system.

7. The U.S. Army Corps of Engineers must address the issue of who will have the legal responsibility for maintaining the experimental project once the Corps and Waterways Experiment Station contractors leave the area. There is no evidence that provision has been made to follow the project through to a successful completion. Pilings remaining once the outer bulkhead rots away may present a hazard to small boats unless removal provisions are made. An unexpected obstruction will be created when the original bulkhead is cut down to the level of the developing marsh--this may also present a hazard to small boating activities in the Branford River Estuary.

8. It is clear the Branford study area is "marsh-rich" and "flats-and-shallows-poor". While additional marsh would indeed increase primary production locally, the potential for passing marsh production on to higher levels in the food chain would be reduced due to the corresponding loss of flats and shallows. The potential disruption of the dynamic interaction between the existing marsh areas and existing tide-flat and shallows areas

should be addressed in the Final EIS in terms of their role in cycling of nutrients to fin and shell fisheries resources. The role played by the eight acres of flats and shallows to be destroyed by the Marsh Development Project should be placed in perspective within the total economy of the area's wildlife resource base.

9. The Draft Statement does not develop or discuss contingency plans for the experimental project; no "acceptable" alternative sites other than the present one, adjacent to a valuable ecological unit, are identified in the draft. The Department believes acceptable alternative sites should be investigated and evaluated.

10. Our records indicate there is considerable local opposition to the marsh creation aspect of this maintenance dredging project. The rights, interests, and opinions of the owners of the twenty-nine to thirty adjacent and upland private properties directly affected by the experimental project, are inadequately addressed in the Draft EIS. However, we understand the Corps will hold a public hearing on the matter in July.?

11. Public safety precautions are inadequately addressed. The experimental project will be an attractive nuisance during as well as long after construction and experimentation is terminated. These matters should be addressed in the Final EIS.

Thank you for the opportunity to comment on this important project.

Sincerely yours,

Joseph N. Gill

Joseph N. Gill
COMMISSIONER

JNG:jed

34 Pawson Landing Dr
Branford, Conn. 06405

May 20, 1975.

Department of the Army
New England Div.Corps of Engineers
424 Trapelo Road.,
Waltham, Massachusetts 02154.

Attention: Mr. Joseph L. Ignazio
Chief, Planning Division

Re NEDPL-R

Gentlemen:

I am in receipt of your environmental statement for Maintenance Dredging and Marsh Development Project, Branford Harbor, Connecticut.

Let me preface my remarks by saying that I am not opposed to the dredging of the Branford Harbor however I am strongly opposed to the Marsh Development in this particular area.

My property borders the existing marsh so consequently I am directly affected by this project.

You have mentioned several times in your statement the impact of surrounding property values. This project will have a decided depreciation of property values. The proximity to the water and the views that it offers are a decided factor on the worth of property values. I happened to develop The Pawson Landing Area and have in my possession cost data showing that the people bordering the Marsh paid substantially more for their property than those not bordering the Marsh.

The Marsh as it currently exists today offers much recreation for children and adults alike as there are several small tributaries running through it to neighboring rear yards. At high tide these give access to the Branford Harbor. Your plan will be eliminating many of these. Let alone the odor, that this experiment will be throwing off, will make being out of doors unbearable.

Gentlemen, we in this area are not adverse to experimentation but it just seems logical to the mind that when one experiments he do so in an area that will have no impact upon the citizenry and take away from people what they enjoy and what they have paid for. Some residents in this area in the past few months have worked very hard to see that you do not go ahead with this project in their area and that if you must do this experiment you do it in an area where people will not be hurt by it. Also it seems to me that when this country is being affected with one of the worst economic crisis since the great depression that we can ill afford to spend money on experimental projects such as this. Certainly the people who you are trying to serve cannot let their tax dollars be spent in this area when there is so much to do at this time toward more humanistic goals.

I am not qualified to comment on the technical aspect of your experiment however I have engaged a consultant to do this for me and when I have his comments I shall forward them to you.

Needless to say the abandonment of the Marsh creation project in this particular area is very important to me and I believe it to be also with my neighbors. I personally will resort to whatever means I must to try and stop it.

Sincerely,

Harvey C. Anderson

CC: Sen Abraham Ribicoff
Cong. Robert N. Giaimo
Commissioner Charles Gill
State Sen Stanley Page
State Rep. Joseph Farricielli

30 Pawson Landing Drive
Branford, Connecticut 06405

Attention of: NEDPL-R

June 4, 1975

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division
Corps of Engineers
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

Thank you for the copy of the draft environmental statement on the Maintenance Dredging and Marsh Development Project, Branford Harbor, Conn. This letter is to convey the views of local residents on this project for inclusion in the final environmental statement:

> "We are at last showing an intelligent concern for the preservation of plant, animal and marine life. Is it too much to hope that this concern should encompass human life as well?"
>
> -Jaques Cousteau

Cousteau's words summarize our feelings. We are not opposed to the maintenance dredging of Branford River channel but are opposed to the creation of a disposal site on the tidal flats so near to our homes and the Corps' disregard of the feelings of local residents in this regard. It is not simply a matter of elimination of open water views but also the disruption of one-third of the tidal flat ecosystem and a consequent depreciation in the value of surrounding homes. This constitutes a form of environmental confiscation without compensation to local residents who paid additional amounts for their property to achieve the present water views. The environmental statement gives no recognition to the fact that the entire marsh creation project is being carried out in an area within 200 feet of homes and will constitute a public nuisance. The health problems in creating an additional disposal site have not been addressed, and there is no mention in the statement of the effects of dumping polluted bottom sediments and sludge near human habitation.

Detailed Comments on the Environmental Statement follow:

Section I	Comment
1.08 D	An eight acre marsh will eliminate one third of the tidal flat ecosystem and will block off the existing marsh area in back of the new marsh disposal site.
1.11	Mr. Hanley K. Smith, Manager of Habital Development, WES, Vicksburg, Miss., in a letter (Smith to Kirkland, 4/28/75) has mentioned the negotiation of contract for Phase I pre-operational assessment of the existing marsh. At the most, this pre-operational study will include only 6 months of research before a retaining structure is started and will include no study of late Fall, Winter or Spring ecology or tidal rhythms. This is inadequate research for this kind of project and there is no mention of human environment studies.

1.12 Phase II, the operational phase, is described in definite terms as to retaining structure, type of materials, etc. It is of interest to note that this detail of specificity is spelled out in the statement, obviously without the benefit of the pre-operational study which, to quote Mr. Smith's letter,will, "...include investigation of several aspects of the study site with emphasis on sediment chemistry, hydraulic characterization and sediment transport..." Shouldn't these factors be considered before making any decisions on proceeding with this plan?

It is obvious that the drafter of this part of the statement has little real knowledge of the geomorphological features of the existing marsh, expecially that area behind the proposed marsh creation site. The protection of the existing marsh cannot be ensured by a sandbag dike because the marsh front is highly dendritic and embayed. Perigee and storm tides can be both high and with strong currents. No consideration has been given to preventing dredging spoils from silting inland over the present marsh areas and destroying them.

The environmental statement downplays the fact that the proposed timber restraining structure will constitute a hazard for boats and, more ominously, will constitute an attractive hazard for children from the surrounding area.

1.13 Where were the MIT sedimentation rate studies done? Were they performed in Branford Harbor or elsewhere? If elsewhere, what was average particulate size as compared to average size of material to be dredged from Branford River?

1.15 No mention is made of any trial plantings of local marsh plant species on the sulfide rich, polluted type of sludge that will be dredged from the channel. Have such plantings been carried out; if so, where and when, and with what results?

1.17 Of the home based recreational fleet of 1,075 pleasure craft and 15 commercial vessels, what per cent have drafts of over seven feet? The statistics in this section do not support the need for an 8 1/2' depth channel.

1.18-1.21 The tidal flat is also an important part of the ecosystem and there is no reference to nor study of the adverse effects of substituting marsh for tidal flat. The covering of tidal flats eliminate large shellfish areas and, in this instance, will eliminate winter low tide feeding for large numbers of gulls and flocks of ducks, expecially in the Winter.

1.22 Will the next step at the next dredging be to take the rest of the tidal flat? This entire project is merely a means to get additional disposal area and will eventually eliminate the beauty of Branford's inner harbor.

Section II

2.01 The specific setting for the marsh creation project is in a river embayment surrounded by residential area to the south and the Branford River to the north.

2.35;2.38 Is it typical of the research that has been conducted on this project that no mention is made of the linden (basswood) trees which characterize the upland areas around the site? In fact, the area is known as "Linden" Shore District and "Linden" Avenue is a main thoroughfare. Appendix B, also, does not include any reference to Lindens (Tilia Americana).

2.50 This section, especially the first paragraph, is a good description of the invertebrata subject to destruction by the 8 acre marsh creation project.

2.69 A common basis for community consensus does exist in the surrounding residential area that it is desirable to live near the water, desirable to see the water, and the residents have paid for these amenities. The Corps proposal is counter to the community interest.

2.72 The present estuarine system is biologically diverse and productive. The Corps proposals are "aesthetically" incompatible with the present balance.

2.87 The marsh project is not necessary to the deepening of the channel to 7.5 feet.

Section IV

4.05-4.13 A careful reading of these sections will reveal the experimental and environmentally dangerous aspects of the marsh creation project. Of particular concern is the uptake of toxic substances by plants. It is not reassuring to know that this will be part of the study. Shouldn't this be known before the project is attempted?

4.18 The immediate effect of this project on wildlife and fishery resources will be significant, then, for Pawson Marsh?

4.22 Disagree. This project adds 8 acres of mosquito breeding area and does have an impact on Homo Sapiens who live around the area. This is creation of a nuisance.

4.32 Odor will constitute a public nuisance and the concentration of volatile sulphur and polluted bottom sediments so close to human habitation is a health hazard.

4.33 Statistically incorrect. The existing tidal flats cover about 20 acres. Eight acres of this area constitutes a 40% reduction in the water vista. The Corps errs in also including water areas of the boat channel and yacht marinas. As to the term, "will elicit an adverse reaction," this adverse reaction is already a matter of record with Corps officials and is not of a passive nature.

4.35 The Corps admits it will disturb the peace of the existing setting.

Section V

5.05 The Corps completely overlooks the deleterious effects of its proposals on land and property values by the loss of 40% of the water view. At the next dredging will the Corps take the rest of the tidal flat?

Section VIII

8.03 "The loss of 8 acres of tidal flat is an irreversible and inetrievable loss of a substrate. However, the creation of a new substrate, the tidal marsh, will be a source of increased productivity to the river." This statement is not supported by the facts in the environmental statement. There is no analysis of the contribution of the tidal flats to the ecosystem. It must be emphasized that the present marsh structure and tidal forelands have developed naturally and in the Spring are a major spawning area for vertebrate and invertebrate sea life. The dredged sludge with its high content of hydrogen sulfides will block this spawning in the areas covered, and stifle it in the adjacent marsh areas.

Section IX

9.01-9.04 The case made by local residents is understated. The opposition at these meetings has been well reasoned and vocal. The environmental statement omits the probable use of legal means to stop the marsh creation project if it continues.

A petition of residents against the project has been conducted and a copy of this petition is filed herewith. In addition, the support of local, state and national political representatives against this project is now being solicited.

Summary: MARSH CREATION PROJECT IS HAZARDOUS AND COUNTER TO COMMUNITY INTEREST

We as residents and citizens of the area oppose the marsh creation project because of its confiscation of property value, environmental confiscation of open water vistas, creation of navigational and "attractive" hazards, destruction of the existing ecosystem, creation of a public nuisance, creation of a health hazard and lack of adequate study and planning. We intend to fully pursue whatever means are necessary to halt this project and invite your attention to the over 500 petitioners in opposition to this project.

Thank you for the opportunity to once again comment on your plans.

Sincerely yours,

Robert R Kirkland

cc: Doug Webster, Special Asst. to U.S. Senator Abraham Ribicoff
Stanley H. Page, State Senator, State of Connecticut
Joseph J. Farricielli, State Representative, State of Connecticut
John B. Sliney, First Selectman, Town of Branford
John B. Kirby, Jr., Branford, Connecticut
Linden Shore Tax District
Indian Neck Improvement Assn.
Montgomery Parkway Association

Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts

Re: Branford River Marsh-Building Project

Gentlemen:

As a resident of Branford living in Pawson Park in an area directly adjoining this proposed marsh-building project, please consider this a very strong protest to this plan.

This marsh is presently the largest untouched marsh in Branford and the mud flats to be covered contain thousands of bushels of clams and oysters and as presently constituted is probably the largest natural spawning area in the entire northeast. I am familiar with this area as I have done commercial shellfishing in Branford for 35 years and at one time worked almost six months a year on these particular mudflats.

Various bulkheads that have been built in this area of the Branford River over the years have generally either been carried away or have leaked silt over the adjoining area.

I realize it is your responsibility to dredge the River, but I strongly feel that the off-shore spoils areas should be used for the mud and silt to be carried away and such a plan would cause the least environmental impact and in fact may very well be beneficial to lobsters and fish as my experience in the past has been that both fishing and lobstering on and around the Branford and New Haven spoils area improved after river mud had been dumped there.

This experimental project will cost a great deal of money, taxpayers' money, and I strongly urge that this be spent for dredging and using the off-shore spoils areas.

Quoting an article in the New Haven Register that you have stated - "If the new marsh should be a failure no adverse effect on the existing marsh is expected." - this is of little consolation to those of us who realize that a healthy marsh with all the wildlife that this one sustains should not be subjected to this experiment.

I strongly urge reconsideration of this proposed project, and feel compelled to advise my congressman and senators of my feeling on this subject.

Very truly yours,

Frederick J. Collins

Frederick J. Collins
75 Pawson Road
Short Hill
Branford, Connecticut 06405

APPENDIX N

COMMENTS DIRECTED TO THE MARSH DEVELOPMENT PROJECT NOT SPECIFICALLY DEALING WITH THE ENVIRONMENTAL IMPACT STATEMENT

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Post Office and Courthouse Building
BOSTON, MASSACHUSETTS 02109

MAY 14 1975

Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

This is our Special Report concerning the marsh development project in Branford Harbor, New Haven County, Connecticut. This report is prepared in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), in coordination with the Connecticut Department of Environmental Protection and the National Marine Fisheries Service.

The marsh development project is being undertaken in conjunction with the maintenance dredging of Branford Harbor, and is being conducted by the U. S. Army Corps of Engineers' Waterways Experiment Station (WES), in cooperation with your office.

In our report of July 16, 1974, we stated we had no objections to the maintenance dredging and disposal aspects of the project, providing normal engineering precautions were carried out. We further mentioned the Pawson Marsh as the proposed site for the marsh development project, but withheld further comments until more information was made available to us. The following comments are based on the information contained in the Draft Environmental Impact Statement for the two projects.

Although we support the idea of marsh creation in principle, we feel that the proposed Pawson Marsh site is not the ideal location for a marsh development project. We would prefer to have the project located at the alternate site in Page's Cove, adjacent to property owned by the Ecclesiastical Society of a local church, or at another site with similar characteristics. We believe this site is more desirable because the Pawson area already has considerable marsh acreage, whereas the Page's Cove site is comparably not as productive. We also understand that the Society was willing and interested in accommodating the project.

We are also concerned that the proposed retaining technique of wooden piles is experimental and untested, and considerable damage to an existing resource could occur if it fails.

Therefore, we recommend that additional consideration be given to locating the project at the Page's Cove or another similar site. However, we would not object to the experiment being conducted at the Pawson site if the following safeguards are followed:

1. To avoid altering tidal creek currents in the existing marsh, we recommend the enlarged portion of the proposed marsh be relocated to the upper or northeast end of the marsh, as indicated in blue on the enclosed map.

2. Close supervision should be exercised during all phases of construction and filling of the new marsh enclosure.

3. A definite contractural commitment be made by the New England Division Corps of Engineers and/or the Waterways Experiment Station to fund the project to satisfactory completion, which would be the successful establishment of marsh vegetation at the site.

Sincerely yours,

Richard E. Griffith

Regional Director

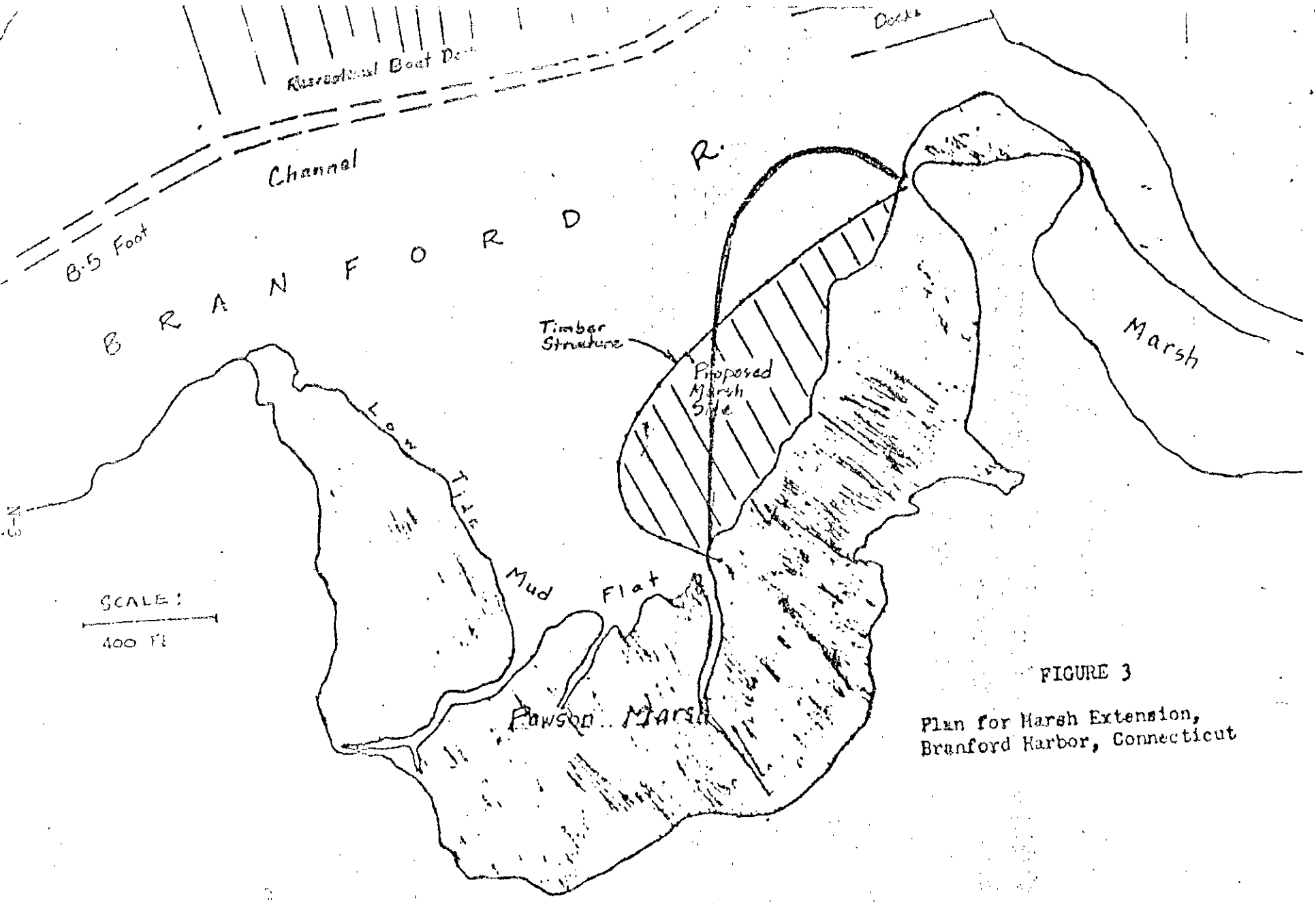

FIGURE 3

Plan for Marsh Extension,
Branford Harbor, Connecticut

State of Connecticut
HOUSE OF REPRESENTATIVES
STATE CAPITOL
HARTFORD, CONNECTICUT 06115

JOSEPH J. FARRICIELLI
ONE HUNDRED SECOND DISTRICT

CHERRY HILL
BRANFORD, CONN. 06405

MEMBER OF
TRANSPORTATION COMMITTEE
REAL ESTATE AND INSURANCE COMMITTEE

May 29, 1975

Department of the Army
New England Division Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Attention: Mr. Joseph L. Ignazio
Chief, Planning Division

Re NEDPL-R

Dear Mr. Ignazio:

I would urge your consideration of possible decreased property values in your plan to create a marsh from the dredging of the Branford Harbor. While I do not object to any action that might reduce property values or hinder the rights of Branford residents to the quiet and peaceful enjoyment of their fee simple.

Thank you for your attention.

Respectfully yours,

JOSEPH J. FARRICIELLI
State Representative

JJF:sak

cc: Mr. Harvey C. Anderson
34 Pawson Landing Drive
Branford, Connecticut 06405

Branford Conservation Commission

BRANFORD, CONNECTICUT 06405

April 28, 1975

Army Corps of Engineers
424 Trapelo Road
Waltham, Mass.

Dear Sirs:

The Branford Conservation Commission would like to endorse the proposal to "build" a marsh along the Branford River. We feel that such an experiment is very creative and hope very much that it works.

Good luck!

Sincerely yours,

Dana Blanchard
Secretary

CASANOVA-BARBATO INSURORS LIFE · HOME · BUSINESS · AUTO
TELEPHONE 481-0351

VINCENT J CASANOVA
JOSEPH A BARBATO

June 18, 1975

Mr. William F. McCarthy
Chief Environment Analysis Bank
Department of the Army
New England Division of Army Corp. Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

RE: Maintenance Dredging and Marsh Development Project
Branford, Connecticut

Dear Mr. McCarthy:

I am writing this letter on behalf of the Branford RTM, which met on June 11, 1975.

They have authorized me to request a suitable alternative to your final plans on the above project. It has come to the attention of the residents in the marsh area to be filled, that the benefits derived are speculative in nature and could develop some serious health hazards. They are fully aware that the dredging project in the harbor is necessary; however, they feel some other alternative for removing the material should be examined in as complete detail as possible.

We trust you will give this correspondence your immediate attention and take corrective action.

Very truly yours,

Vincent J. Casanova
Moderator
VJC/rdp
cc: David Etzel

June 17, 1975

38 Lawson Landing Drive
Branford, Ct. 06405

Mr. Joseph L. Ignazio
Chief Planning Division
New England Division
Corps of Engineers
Waltham, Mass. 02154

Dear Mr. Ignazio,

It is high tide now, in the beautiful salt meadow that the army engineers propose to rearrange. All is quiet, except for the noises in the rising creeks. With the flood of every tide, it is meal time for the little creatures of the meadow. One can hear the splashing and see the fish come to the surface, causing great air-turbances in the little pools.

Ducks glide about, taking sudden dives for unknown treats. We have the beautiful white swans that honor us with their presence, also both the white and blue egret. They'll stand as still as a stick, until something tasty comes within the reach of their long neck. We see sea gulls drop clams to crack them open, and then watch a scrap among them, that takes place over the food. We also enjoy seeing horseshoe crabs, turtles and muskrats, all are residents of this area.

When the sludge of Bramford River is dumped on the surface, it will allow very polluted water to spill over this area, which

is one of nature's feeding grounds.

The emphasis today that is on ecology and the preservation of the balance of nature, isn't considered in this case. Now, as I understand this project, the small creeks, (which are the life of the meadow), will be filled in. This must not happen, and this lovely area should not be disturbed especially by a project which is admittedly experimental!

Sincerely,

Mrs. George R. Libby

Dear Sir:

I wish to bring to your attention this letter concerning the environmental impact statement of the Army Corps of Engineers regarding their proposal to eliminate a Branford, Connecticut tidal flat and to seriously endanger a vital healthy river and marsh system by building a 1/3 mile long barricade and dumping dredgings there under the guise of 'marsh building'.

I am sending copies of this letter to all agencies and organizations listed in the report plus numerous local interests. Acknowledgements and comments will be appreciated.

Sincerely, John B. Kirby Jr.

John B. Kirby Jr.

June 5, 1975 BRANFORD REVIEW

Corps report on marsh creation is "misleading"

To the Editor:

The proposal for eliminating a valuable Branford River ecosystem and experimenting with eight acres of marsh and barricade building in an area of abundant, healthy and beautiful marshes is described in a Department of the Army publication. The report is a lengthy bureaucratic compendium of miscellaneous information, mistakes, distortions, erroneous lists, and trivia. Its highlights are its omissions and — strangely enough — some of its conclusions.

The full title is "Maintenance Dredging and Marsh Development Project, Branford Harbor, Conn. — Draft Environmental Statement". It is available free from the Department of the Army, New England Division, Corp of Engineers, Waltham Mass.

My objections to this proposal are with regard to the dumping of dredged material in a barricaded tidal flat area under the guise of marsh building rather than to the dredging which is important to the town and should be completed without delay. A recent project in New Haven Harbor has determined that dumping dredgings at sea is ecologically feasible.

The report states that the citizens of Branford are primarily "of European origin with English, Dutch, German, and Italian ancestry". Later it states, "The average annual snowfall over the Branford River basin is about 35 inches. Spring melting of winter snow occurs generally in March or early April." These statistics might come as a shock to our Irish, Scandinavian, and Polish friends, but ski enthusiasts will be overjoyed at the prospect of snow! Perhaps, we can turn Branford Hills into a ski resort; it already has an Alps Road.

The report states, "Very little land is in public ownership (approximately 600 acres) and only 76 percent of this actually devoted to active recreational use". Much of this report was written in Vicksburg, Mississippi, and this partially explains the ineptitude of those writing about the area which they wish to be their marshland guinea pig. They should know that Branford is a leader in the amount of recreational land which is available through its parks and open spaces. The report notes that the town owns very little beach area but carefully neglects to mention that the barricade and marsh experimentation which will keep the water disturbed for some time is within about 2,500 feet of the Town Beach. The five maps which cover the area of the Town Beach do not depict it. The private swimming beach of the Pawson Park on the River Association, which serves many homeowners, is less than 2,000 feet from the projected experiment.

The report is too long (about 190 pages) to cover in detail, but the section on birds stands out when it comes to misinformation. In two different sections it states that permanent residents of the Branford Harbor area are the great blue heron, the black-crowned night heron, the yellow-crowned night heron, Canada geese, and the killdeer; these area all wrong. The great blue heron visits in the spring and fall but rarely for more than 24 hours; the others are seasonal visitors. The report has the cormorant in fresh water ponds rather than salt water and mates the cormorant with the mute swan which doesn't matter too much because the information

(Continued on page 14)

on the swans isn't correct either. Space does not allow me to innumerate more mistakes. Some of this misinformation was caused by garbled telephone messages, because the Corps has too much money and doesn't write letters from Mississippi when it can use the telephone.

The Army report emphasizes the advantages of a new barricaded pseudo marsh when it could write even a thicker report on the value to the entire ecosystem of the eight acres of tidal flat which it intends to destroy. The tidal flat area is carefully determined by the balance of nature. It is a vital necessity to marine organisms and, therefore, to fish, birds, and animals. Its value and importance should not be underestimated. The report states, "The loss of eight acres of tide flat is an irreversible and irretrievable loss of a substrate."

The report lists 17 mammals that might be affected by the project but fails to include man. One map which is repeated four times of the Branford Harbor area fails to show any residential roads near the area to be barricaded, but does show roads that are not near the project. Another map goes to great length to show recreational boat docks but shows neither houses nor roads. Still another map shows detailed information on the contracted spoil dumping areas, but there is no map showing property owners adjacent to the marsh and barricade building areas; does the Army want them to disappear or just fade away? The problem of who will own the newly created barricaded pseudo marsh is not discussed nor is the problem of whether land will be taken for the project by the government. Land values are bound to be affected by the creation of a barricade a third of a mile long and six to eight feet above the tidal flat and several feet below holding back odiferous polluted mud where the natural beauty of a riverside formerly existed. This particularly affects the residents of Old Pawson Landing — a beautiful area of expensive new homes. The report does not mention mosquito control which is important to barricaded wet areas which do not have the advantage of dirunal tidal flow.

the meteorological [illegible] which influence the marsh and barricade building area. They base abnormal tides on hurricanes and storms that occured twenty-five or more years ago, and even then they are partially based on estimates and measurements at Bridgeport harbor! It is realized that a hurricane taking a nearby path at high tide represents the maximum threat to the area, but in more recent times the more destructive storms have been extratropical slow moving or stalled low pressure areas which batter the coast at high tide and-or tides which are abnormal because of lunar influences. The marsh and barricade building area is most susceptible to these storms when the wind blows from the southwest or west blowing the water into the mouth of the river and trapping it there.

Ice plays an important role in winter storms and although the word is not mentioned in the report, the people of Mississippi must have learned of it by now because almost all of the many surveying stakes that delineated the marsh and barricade building area were swept away by ice this last winter. If they can't plant stakes, how can they plant a one third mile barricade six to eight feet high and marsh grass?

Trivia in the report is widespread, and it is a must for the serious collector. It is very hard to pick the best, but my favorite concerns statements on two pages stating that the mud flat is not potentially eligible for the National Register of Historic Places. This is backed up by a two page historical register appendix which reproduces a letter in full from the Connecticut Historical Commission which also states that the mud flat is not potentially eligible for the National Register of Historic Places.

Readers of the report must form their own conclusions. I quote the first sentence from a paragraph of the report's conclusion: "Adverse Environmental Effects: Associated with maintenance dredging will be an increase in turbidity in the water, disruption of benthic communities, disruption of fauna and flora associated with the land disposal areas and disturbance to the local human population."

JOHN B. KIRBY JR.

June 16, 1975

Mr. Joseph L. Ignazio
Chief, Planning Div.
New England Div.
Corps of Engineers
Waltham, Massachusetts 02154

Gentlemen.

Enclosed are two clippings from local newspapers concerning the marsh creation project.

It seem to me that what is being said in these articles should make you aware of the strong statement against the marsh creation project in this area.

I sincerely hope that you will have regard for the wishes of the people that you will be affecting and that you will not go ahead with the project in this area.

Very truly yours,
Anne M. Anderson

June 12, 1975 20 Cents

500 oppose marsh creation in Branford

About 500 persons have signed a petition opposing the creation of a marshland in the Branford River in the Pawson Park area as being counter to community interest and have submitted the petition to the Department of the Army, New England Division, Corps of Engineers, which proposes the project.

The petitioners are in opposition only to the marsh creation and not to the Corps proposal for maintenance dredging of the Branford River channel. The marsh creation project, outlined in detail in an approximate 190 page draft environmental statement by the Corps, proposes to use dredged materials to create on an experimental effort, a marsh in the tidal flats.

The petitioners also object to what they call "the Corps disregard of the feelings of local residents" who have voiced concern about the project for what is described as "creation of a nuisance."

A letter to the corps accompanying the petition, was submitted by Robert Kirkland, a Branford resident and ex geologist, who resides on Pawson Landing Drive, in the vicinity of the proposed project.

"The marsh project is not necessary to the deepening of the channel to 7.5 feet," Kirkland stated.

"An eight acre marsh will eliminate one-third of the tidal flat eco-system and will block off the existing marsh area in back of the new marsh disposal site." Kirkland found in review of the Corps plans as published in a lengthy 190 page draft environmental statement.

"The environmental statement gives no recognition to the fact that the entire marsh creation project is being carried out in an area within 200 feet of homes and will constitute a public nuisance," Kirkland said in his response to the Corps plan.

Failure of the Corps to conduct adequate research for this kind of project was also charged by Kirkland.

"The tidal flat is . . . an important part of the ecosystem and there is no reference to nor study of the adverse effects of substituting marsh for tidal flat. The covering of tidal flats eliminates large shellfish areas, and, in this instance, will eliminate winter low tide feeding for large numbers of gulls and flocks of ducks especially in the winter."

"Will the next step at the next dredging be to take the rest of the tidal flat? This entire project is merely a means to get additional disposal area and will eventually eliminate the beauty of Branford's inner harbor," Kirkland charged.

"The Corps proposal is counter to the community interest . . . The present estuarine system is biologically diverse and productive. The Corps proposals are 'aesthetically' incompatible with the present balance."

The petitioners notified the Corps, "We intend to fully pursue whatever means are necessary to halt this project," and also report that they intend to seek support for their effort to oppose the project from local, state and national political representatives.

Branford Review
6/12/75

Town Meeting In Recess After Handling Loose Ends

By PHIL GREENVALL
Staff Reporter

BRANFORD — The Representative Town Meeting held its final meeting before the summer recess Wednesday night and spent 50 minutes disposing of loose ends.

Included in the business were budget transfers totaling $37,487

The major transfer saw $30,000 taken from unappropriated surplus and credited to the police retirement fund

The transfer was required to keep the pension fund current, Majority Leader William Bratten explained. No money was budgeted as the town's contribution to the fund this year since negotiations on pension improvements were going on and the Board of Finance wanted to take a closer look at the actuarial health of the fund. The board has finished reviewing the fund and negotiations were recently completed, and now the town's contribution is due, Bratten said.

In a related matter the RTM agreed to request that members Ralph DeAngelo and John Sciarra be added to a Board of Finance subcommittee which is studying methods of financing the new pension improvements

Other transfers approved were $6,089 from unappropriated surplus to employe group insurance to cover rate increases; $1,298 from revenue sharing to the Stony Creek Community Center for a fire escape and plumbing; and $140 from office supplies to business expense at the Willoughby Wallace Library to cover the cost of professional conferences.

The RTM removed an ordinance relating to the hours of trash collection from the table and voted not to take any action, which in effect kills the item. Ann Lynch opposed the move, noting that some persons are still disturbed in the early morning by trash trucks but the rules and ordinances committee felt that there is "lack of real interest" in the garbage truck ordinance Bratten noted that the real problem is noise pollution rather than the time that the trucks make the rounds.

A bicycle ordinance requiring the licensing of bikes using public roads or bikeways was unanimously approved without opposition. The police will run the registrations.

David Etzel Jr. asked that the RTM write to the Army Corps of Engineers asking that it do no work on the proposed experimental marsh area in the Branford River until the RTM has a chance to review the proposal. The Corps plans to conduct an experiment in "marsh creation" on the flats just north of Pawson Park

N. Haven Register
6/12/75

Etzel said that despite opposition from local residents the Corps seems intent on "railroading" the experiment through.

In an unusual Bratten happening was the lone Democrat to vote with three Republicans in opposition to the proposal to write a letter to the Corps. Still the motion was carried. Bratten argued that if the RTM is going to tell the Corps not to dump on the flats, it should at the same time offer an alternative dumping area.

[illegible] voted to send a letter of appreciation to Recreation Director Joe Trapasso for his 28 years of service to the town. Trapasso has done a "tremendous job," Bratten said as he suggested that the letter be sent.

STATE OF CONNECTICUT

STATE DEPARTMENT OF HEALTH

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

OFFICE OF PUBLIC HEALTH

Mosquito Control Section
Mill Road, Madison, Connecticut

September 18, 1975

Mr. Vito L. Andreliunas, Chief
New England Division Corps. of Engineers
424 Trapelo Road
Waltnam, Massachusetts 02154

Dear Sir:

I have received word from Mr. Zell Steevers of the Connecticut Department of Environmental Protection concerning a change in the Maintenance Dredging and Marsh Development Project in Branford Harbor, Conn. I understand that the idea of creating an experimental 8 acre marsh , abutting an existing salt marsh at Pawson Park in the Branford River, has been abandoned and that a new plan calls for the creation of a 3 acre island twenty-five feet off the existing marsh.

I concur with the Conn. Department of Environmental Protection and agree that this island plan has considerable merit since it does not disturb the hydrologic pattern of the existing marsh and should obviate a good many objections of the local citizenry. The new plan appears sound and should be acceptable to all interested parties.

Very truly yours,

Julius Elston

Julius Elston, Chief
Mosquito Control Section

JE/se